Australian Model Engineering

November-December 2002

Issue 105

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(inc. GST)

NZ$9.50*
(inc. GST)

LOCOMOTIVES, TRACTION & STATIONARY ENGINES, BOATS, WORKSHOP, PRODUCTS, CLUB NEWS & EVENTS, REVIEWS

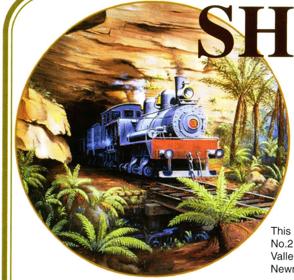
In This Issue:
- ☑ Boiler Building for Beginners
- ☑ Universal Test & Demo Stand for Locomotives
- ☑ Helmholtz Valve Gear

06
9 770819 473012

Print Post Approved, Publication No. PP228582/00001

*Recommended Retail Price

SHAY



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This plate depicts Shay locomotive No.3 of the Commonwealth Oil Corporation leaving No.2 tunnel (now the glow worm tunnel) and entering Penrose Gorge on the Wolgan Valley Railway near Lithgow, NSW circa 1912. The railway ran about 31 miles from Newnes Junction to Newnes. The line was abandoned in 1937.

Plate shown smaller than actual size. Plate 210mm dia. Mug (not shown) 95mm

Order Form for limited edition collectors plate entitled SHAY

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ADVERTISING DEADLINE

Please have your space for

January-February 2003

issue booked by:

15 November 2002

November-December 2002 Issue 105

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Front cover

Seen on the Morphett Vale track is John Wakefield's model of the South African Railways proposed class 22. This massive machine makes another appearance in Club Roundup on page 55. How about an artcle on it, John?

Photo: supplied by J Wakefield

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- 240 Volt
- 3/4HP
- 16-speed with 16mm chuck
- 1m High

$299 (D138)

Pedestal Model
$339 (D140)

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M740	6"/150mm Digital Vernier	$89
M742	8"/200mm Digital Vernier	$115
M743	12"/300mm Digital Vernier	$174
M760	0-1" Micrometer	$30
M770	0-25mm Micrometer	$30
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- 1/2HP, 240V Motor
- 3 speed pulley drive
- Automatic electric cut-out
- Portable on wheels
- Cuts to 45° in vice

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Ideal for Model makers and light engineering

- 3/4HP, 240V Motor
- 6 speed (125-2000rpm)
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Deadlines for issue 106

Club Roundup	**Nov 8**
Letter Box	**Nov 8**
Classified Ads	**Nov 22**
Mailout Date	**Dec 17**

Comment

As I recall it, I used the same heading this time last year. It is still just as relevant as the events of the last twelve months seem to have simply made this message all the more imperative. Perhaps the world's political leaders all need to take up a hobby like ours, and then they would have a creative outlet to control their frustrations and desire for power at any cost.

Some of you may notice a few unplanned 'changes' in this issue of *AME*. I trust that you will not be too critical on this occasion as we recently experienced a major disaster in the editorial department. This issue was almost complete, ready for the printers when the publishing software crashed. The entire magazine was lost as was the backup copy when I tried to access it. The result was that in the last week I have had to do a 'crash' course in learning how to use a different software package and re-create the magazine from scratch. Re-doing a month's work in a week does not leave a lot of time for thorough checking and missing the printing deadline would result in the magazine reaching you late — something I find unacceptable.

2002 has been a good year for model engineering. We saw the entry of Tasmania into the convention circuit with the successful event staged by the members of the Evandale club, and thoroughly enjoyed by all who attended. The Melbourne SMEE once again staged a very successful exhibition (*there will be a full report in the next issue*) and the Illawarra Live Steamers hosted the biggest Hot Pot run yet. Admittedly, some interclub runs have had lower attendances and when you consider the current economic factors this is not surprising. These events have, however, still been very enjoyable. The biggest cloud over most clubs is still the issue of insurance, but even on that front there appears to be a glimmer of light at the end of the tunnel as some are finding their own solutions and some governments are also starting to become involved. The best advice is "Hang in, there".

As you read this the Christmas holiday season is not far away and no doubt you have already made your plans. Whether you are heading off for a break or concentrating on getting something done in the workshop, I wish you happy and safe holiday season.

David

Join us in a great hobby!

If this is your first issue of *Australian Model Engineering*, welcome!

In successive issues we cover many topics centred on that wonderful process of model engineering — alias *tinkering*.

If you're new to model engineering as well as to our magazine, you'll benefit from getting together with other model engineers — we're good at sharing ideas and saving each other money! If you don't have any contacts, start by looking in Club Round-up to find a club that's near to you. Many of our readers have discovered people with similar interests literally just around the corner.

Helping other model engineers is the simple idea of the volunteers behind this magazine. Our readers write items for us — for the same (non-existent) rate of pay! If you have ideas, opinions or techniques that you feel would be interesting to others (especially from the newcomer's angle), please drop us a line. We can send you a useful guide and help with preparing artwork or editing.

I hope you'll enjoy the great fellowship that makes our hobby special, and that you'll support our advertisers — after all, they help pay our bills!

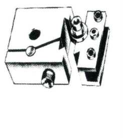
David Proctor

Managing Editor

Round up of Gift Ideas from MINI TECH

QUICK CHANGE TOOL HOLDERS

Make life more enjoyable with this user friendly system, each tool can be set at the correct centre height easily and quickly.



THQC-BL

Quick change tool holder set 1 x Clamp + 2 Holders & 1 large holder for parting & knurling tools. Low cost quic change tool holding system Suits lathes to 4"/100mm chuck. Holders accept tool shanks to 1/2" or 12mm

$95.00

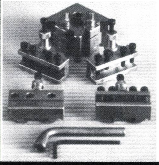
THQC-SM

Quick change tool holder set, 1 x Clamp plus 3 Holders. Suits lathes up to 3" or 75mm chuck

$89.00

THQC-DXS DIXON STYLE

Ground precision quick change tool holding system comes with **Quick Change Tool Holder Block + 3 Standard Holders + 1 Parting Holder + keys.**



This is a tooling system for turners who want quality at an affordable price. Suits lathes up to 5" or 125mm chuck.

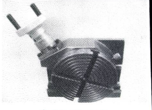
$299.00

ROTARY TABLES HORIZONTAL/VERTICAL

RT-040

Use as a rotary table or rotating angle plate, has a 100mm or 4" table diameter

Ideal for use on small mills and vertical slides



$297.00

CK-RT040 CLAMP KIT to suit **$29.50**

VERTEX HV—4

Vertex quality 100mm / 4" rotary table.

Can add Dividing Plates.

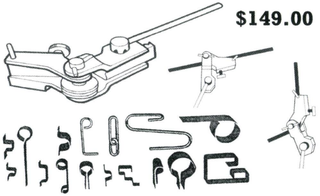
This is a quality tool at a reasonable price

$385.00

Universal Metal Bender

Bends strip to 40 x 4mm, tube to 10mm, solid round to 6mm. Comes with 6 mandrels for flat and 4 mandrels for tube and solid round. A great easy to use tool for Modelers, Metal Crafters or any one wanting to add that finishing touch to their work. Shapes are only limited by your imagination.

$149.00



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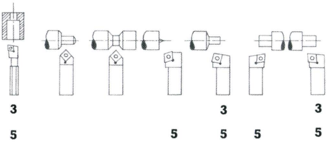
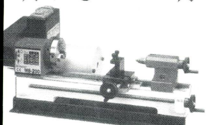
Three kits are available, 3 piece, 5 piece and 7 piece. Refer to the profiles below, tools with a **3** underneath indicate a **3 piece** set and a **5** is a **5 piece** set.



Shank size	3 piece set	5 piece set	7 piece set
8mm	$99.00	$187.00	$264.00
10mm	$115.50	$198.00	$286.00
12mm	$132.00	$220.00	$297.00



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Technical Data:

10 Speeds	130-4000RPM	Swing diameter over bed	96mm
Chuck Capacity	50mm	Swing diameter over tool carrier	66mm
Distance between centres	200mm	Size of Lathe	450L x 250W x 190H

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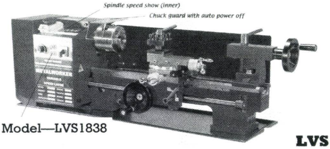
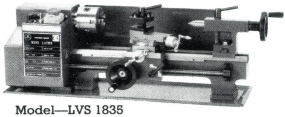
$695.00

Complete with:,- 3 Jaw chuck, Tail Stock Centre, Feed Gearbox & Tool holder

VARIABLE SPEED LATHES LVS1835 and LVS1838



Model—LVS1838



Model—LVS 1835

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- Full Variable speed, with high / low range
- High spindle height
- Large spindle bore
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- Excellent quality

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- Four way tool holder
- Change gears
- Splash guard
- Drip tray

XMAS SPECIAL
ACCESSORY PACK

LVS1835-07 - Live centre
LVS1835-12 - 11pce tool set
LVS1835-13 - 13mm drill chuck

$140.00 worth of accessories for only **$99.00** when you purchase either an LVS1835 or 1838 during our xmas special period.

OptionalAccessories,
- Fixed steady
- Live centre
- 13mm drill chuck
- Traveling steady
- 160mm face plate
- 4 jaw independent chuck
- Inch thread cuttingkit
- TCT and HSS Tooling
- Quick change tool holder

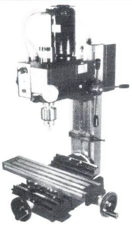
MSV0940
VARIABLE SPEED MILL

$999.90

Features:
- Head rises and falls in dovetail or vee type slide
- Head tilts for angled milling
- Variable speed with Hi / Lo Gearbox
- Wide speed range
- Good Quality

Standard Equipment:
- Drawbar
- 1-13mm Drill chuck

Optional Equipment:
Milling vice, Milling collet chuck set, Boring head, Clamp kit and Stand.



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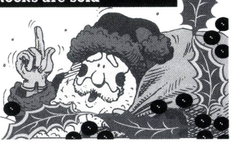
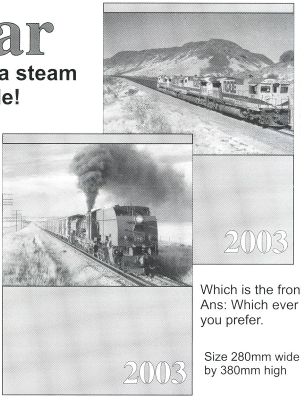


2003 Calendar

Two Calendars in one! You can have a steam month, or a diesel month... You decide!

For the steamy minded...
SAR 460 on a goods near Gumbowie. 3811 on the "Central West Express". VR N410 with K181 near Emu. NSWGR vintage 1709 and 1243. QR D17 on the 'tin set' at Enoggera. NSWGR 3648 and 6005 on No.42 goods from Dubbo at Amaroo. WA W921 at Palgarup. VR R748 on an Ararat-bound goods at Cressy. NSWGR 1903 at Darling Harbour. SAR T class on an empty wheat approaching Warnertown. Streamlined 3803 departing Newcastle. 6037 on coal duties at Newdell. 3020 hauling No.46 passenger across Talbragar river bridge.

For the diesel minded...
Robe River's 9411, 9420, 9421 and 9424 near Harding dam. SAR 4913 and 4838 on No.516 goods near Brewongle. QR 3907 on the "Westlander" at Harlaxton. Vline A62 on Seymour passenger. NRR 42206 and 42103 on ballast duty. EBR 1102, 1003, 1105 and 1103 on an ore train through Ridgley. SAR 503 at Mile End. SRA 8010 on XPT duty at Smith's Hill. Vline N461 and N464 on the "Overland" at Warrenheip bank. Austrac's No.103 and Silverton's 442s2 near Brownsville. Silverton 442s4, 442s2 and 48s33 on goods at Douglas Park. AN 603, 964 and 705 on ore train near Olary. Freight Australia's X40 and G543 on goods at Penrose.



26 full-colour photos

Which is the front?
Ans: Which ever you prefer.

Size 280mm wide by 380mm high

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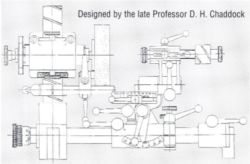

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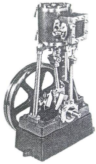

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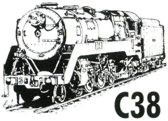

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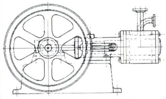

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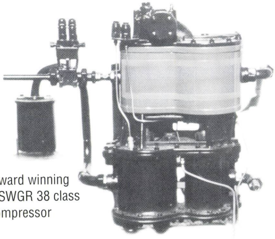

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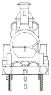

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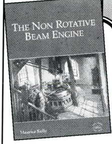
THE NON ROTATIVE BEAM ENGINE

Maurice Kelly

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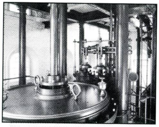

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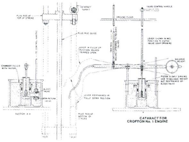

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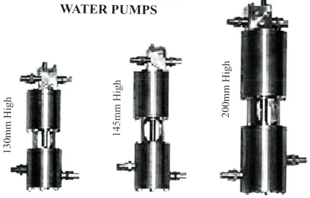

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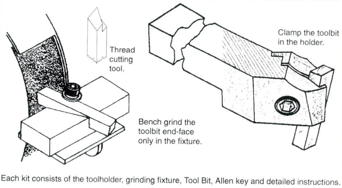
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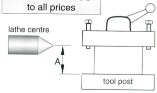

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Boiler Building for Beginners

by Bob Brown

Drawings for publication from the author's originals by Clive Harnwell, photos by Jon Milne-Fowler

Recently a fellow model engineer came to see me and asked if I could help him with a problem that he experienced while building the boiler for his 5" gauge locomotive.

This being his first boiler, he was following the usual practice of silver brazing the tubes into the firebox tube plate, i.e. firebox on the bench, tubes pointing skywards (**Fig. 1**). While silver brazing the tubes in, it seems things got a little too hot and one of the tubes moved and slipped down into the firebox about 10mm and re-sealed itself — "bugger"!

After inspecting the firebox, I made the comment that it was his lucky day because the offending tube was right alongside the wrapper plate and I was confident we would be able to cut and drill the tube out and silver braze in another one. This is in fact was what we did, and he departed my workshop with a smile on his face — something that was not there when he arrived, I can tell you.

At the time of this bloke's visit, my current workshop project was a boiler for one of LBSC Locomotives the 5" gauge tank engine *Pansy*. (**Photo 1**)

As I had just silver brazed the tubes into the firebox tube plate for this boiler, I thought that for the benefit of the beginner doing this job for the first time, I would offer my usual way of doing it. The method is simple to set up using common materials found in the home workshop, there are no jigs or aids to make, and most important, the tubes are held in the correct position and cannot move during the silver brazing operation.

Fig. 2 and **Photo 2** shows the set up and I am sure you would agree with me that this is a much better and practical way of silver brazing tubes into the fire box tube plate. You will note the fire box is now inverted and is resting on the two pieces of steel flat bar supported by six house bricks, the fire box being packed to the correct height using shim pieces of steel. Correct height is when the tubes project through the tube plate by 3mm minimum.

Also note that the back plate of the firebox is not fitted at this stage — this is done after the completed tube assembly is fitted

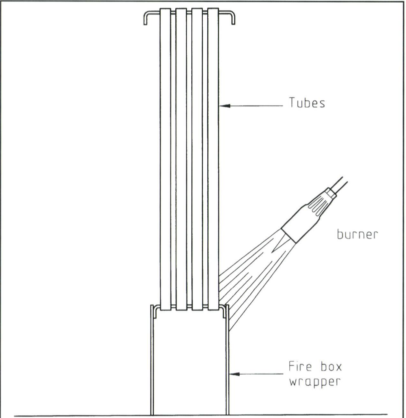


FIG 1 Traditional method of brazing Fire tubes into fire box tube plate

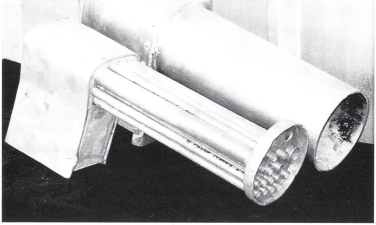


Photo 1

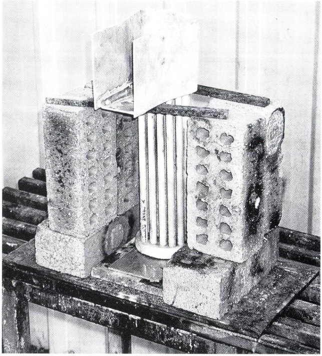


Photo 2

into the barrel. After manufacture, tubes are easily assembled down through the firebox and guided into their positions in the smoke box tube plate, which is in the correct position on the base plate.

Fig. 3 shows in detail the parts made, assembled, and ready for the silver brazing operation. Note the .005" gap at the tubes where they go through the tube plate. This is very important for it allows the free penetration of the silver brazing material between the plate and the tube. Manufacturing the parts to achieve the correct condition for silver brazing (Fig.3) is worthy of a description and the following is my usual way of doing it.

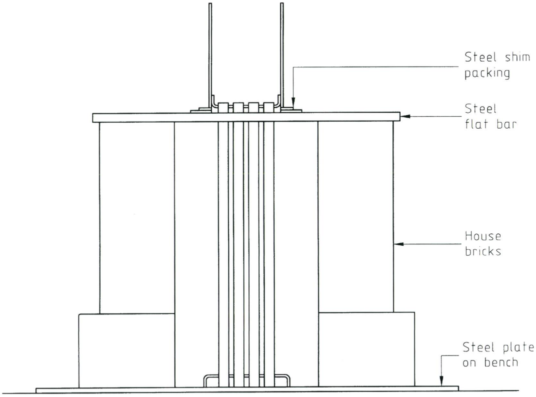


FIG 2 Method of supporting fire Box & tubes for brazing

Firebox tube plate

After making this plate and drilling 3mm pilot holes at the tube centres for the tubes to be used, i.e. 1/2" drill for 1/2" tubes, always have the job clamped to the drill table when drilling for the tubes (**Fig. 4**). With the job firmly held, it's now an easy and safe operation to drill for the tubes. Always be mindful that when drilling for tubes in copper, the drill must be sharpened to a negative rake to the cutting edge, and run at a slow speed, as well as brushing the job with some cutting fluid before starting.

TIP: When positioning each tube for drilling, don't move the clamped set up, but slacken the column and table clamps to adjust the drill table to suit each tube.

Final operation after drilling all the tubes and with the set up still clamped to the drill table is to remove the burrs from the edge

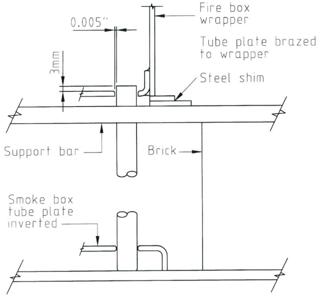


FIG 3 Component Assembly prior to brazing operation

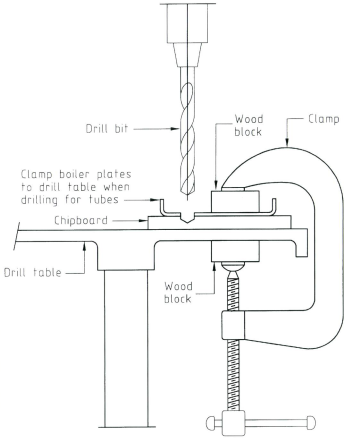


FIG 4 Method of Drilling Tube Plates

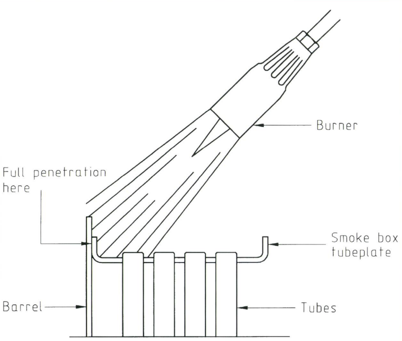


FIG 5 Method of Brazing Smoke Box Tubeplate

of the hole leaving a light countersink. The reason for this light countersink is to provide a lead only for the silver brazing alloy to run around the tube and penetrate the tube plate.

To de-burr and make the countersink — replace the 1/2" drill with a larger one and with the power switched "OFF" to the drill, pull the drill down onto the job lightly with one hand, and pull the drive belts around with the other. Doing this last operation by hand is in my experience the best way to do it. It is safe, and you are in complete control of the amount of metal to remove.

With all the tube holes now drilled and de-burred, remove from the drill bench and go over both sides of the plate with a flat file removing any burrs still remaining. Now, with a 9mm round file, lightly ease the tube holes in the plate so the tube will just fit. The fit is deemed to be correct when the tube will just fall through the plate unsupported.

Smoke box tube plate

The smoke box tube plate is drilled and prepared for the tubes as for the fire box tube plate but with the addition of the light counter sink to ?both? sides of this plate (**Fig. 3**) The purpose of the countersink on the back of the plate is used as an aid for assembling the completed fire box tube assembly and the barrel prior to the final silver brazing of the two assemblies together. Note also that the smoke box tube plate will be silver brazed into the barrel, the complete opposite of which is considered by many to be the usual way of doing it (**Fig. 5**).

The reason for doing it this way is that the flange is now fully exposed to the direct heat of the burner, which will go a long way to ensuring full penetration of the silver brazing material through the joint between the flange and the barrel.

Fire tubes

Note that the length of the fire tubes is always nominal length plus 6mm. The extra 6mm is for the projection of the tubes through the plates by a minimum of 3mm each end. Note also that each end of the tube is prepared differently i.e. the fire box end is left square, and the smoke box end has a bevel to it.

This bevel is used as an aid on the final assembly of the tubes into the smoke box tube plate. When preparing fire tubes it is usual to do them in a repetitive manner and the following is the way I do them.

Step 1: Cut all the tubes including the super heaters to the nominal length plus an extra allowance for facing off.

Step 2: Prepare one end of all the tubes for the firebox tube plate.

Step 3: Mark the tubes to the correct length from a master tube and then prepare the smoke box end to all the tubes.

Step I

Cut all the tubes to the nominal length plus 10mm using the bench vice and the hacksaw. **TIP**: when cut-

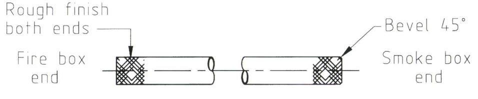


FIG 6 Fire Tube Preparation

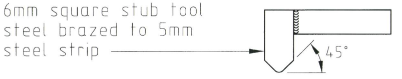


FIG 7 Combined Bevelling & Facing off Tool

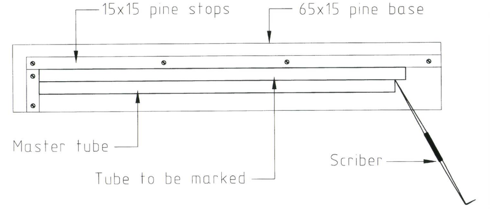


FIG 8 Marking Jig

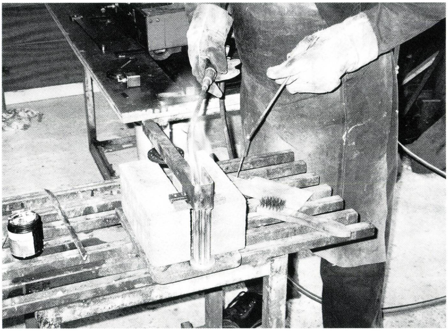


Photo 3 — brazing tubes into tubeplate of a very small traction engine boiler

ting the tube material by the above method - cut the tube half way through then slacken the vice jaws and twist the tube away from you 90° then with the tube held again, in the vice, complete the cut. You will find the above method will produce a more square cut to the end of the tube leaving the minimum for facing off in the lathe.

Now using the first tube cut as a template cut the remaining tube material until you have enough tubes for the boiler.

Step 2

Fire Box Tube Plate End: with all the tubes cut to length and laid out on the bench, select the "shortest" one and put it in the 3 jaw chuck with about 10mm projection from the jaws, and face off the end. With the power switched "OFF" to the lathe and a smooth flat file held in the right hand, remove the burrs from the end of the tube, pulling the chuck around with the left hand.

Next process is to remove the burrs from inside the tube. This is done with a round file, once again pulling the chuck around by hand.

Final job is to remove the tube from the chuck and with some course emery cloth held in the fingers, twist it around the end of the tube a couple of times leaving a rough surface to the copper (**Fig. 6**). The reason for the roughing of the surface to the end of the tube is to provide the ideal condition for the silver brazing material to wet or bond to the surface of the copper which will produce a sound joint. **TIP**: Don't be tempted to do the emery cloth part with the tube in the chuck under power, the object of the exercise is to rough the surface of the copper, not reduce the diameter of the tube!

Step 3

Smoke Box Tube Plate End: Take the tube just prepared for the firebox end and measure exactly the nominal length plus 6mm and mark it with a scriber. Put the tube back in the chuck and face off up to the scribed mark, leaving the mark in. Next step is to put the bevel on the end of the tube. This is done by using a simple homemade facing and bevelling tool mounted permanently in the four-way tool holder (**Fig . 7**). For my money this one of those "I wonder how I ever managed without it" tools, and well worth the effort in making one.

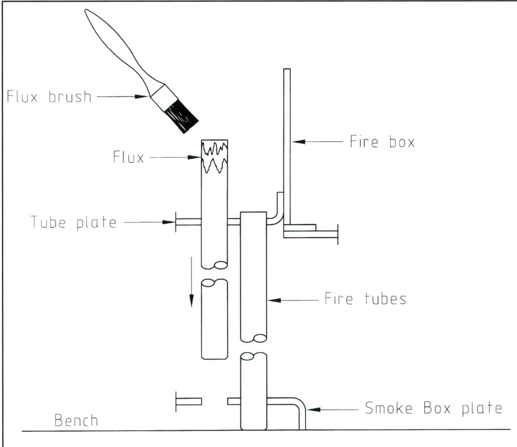


FIG 9 Fire Tube Assembly

The final steps in the preparation are the same as the fire box end, e.g. remove the burrs from inside the tube and rough the surface to the end with the emery cloth. This tube is now deemed to be the master tube from which all the remaining tubes will be measured from and is marked with a permanent marking ink pen or engineers blue for identification.

Now with the master tube made, the rest of the tubes can be completed. First step is to prepare the firebox end to all the remaining tubes as described. Step two is to mark the tubes with the master and prepare the smoke box tube plate end, also as described.

When using the master tube as a template, I use a simple jig made from wood (**Fig. 8**)

Preparation for brazing

With all the tubes now prepared and ready for cleaning prior to the silver brazing operation, I now have a trial assembly of the parts (**Fig. 9**) by doing this I can be sure that the firebox and the tubes are to the

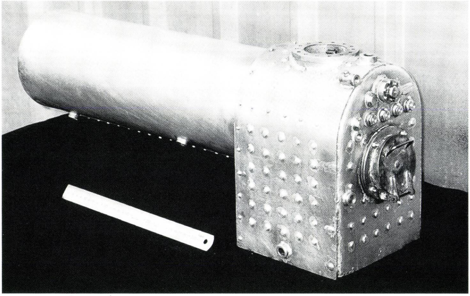


Photo 4 — Hunslet type boiler for the author's 0-4-0 *Wombat*

correct height and all will be well for the silver brazing operation. After I am satisfied that all is okay, I remove the tubes from the set up and put the fire box end in some acid pickle for cleaning. For this I use a plastic bucket with about 50mm depth of pickle in the bottom.

The firebox is carefully removed from the steel supports making sure no shim packings are disturbed and placed in my pickle bath. The acid I have always used is sulfuric as sold by the battery only outlets or auto shops. It comes in 1 litre plastic bottles and sells for about $4.00. Mixed with water approximately 20 to 1 ***(Safety First: always put the acid in the water)*** I find this brew will clean copper parts good enough for silver brazing after about 10 minutes.

After removing from the pickle bath and washing well in water the fire box is assembled back on the steel supports in the correct position and the tubes are assembled again down through the fire box tube plate starting with the row next to the crown.

As each tube is assembled down through the fire box tube plate, (**Fig. 9**) the fire box end of the tube is brushed with brazing flux and when it is down and in position twisted around to amalgamate the flux between the tube and the fire box plate, a hand tool for doing this is a pair of pointed pliers. With all the tubes down and fluxed a final check is made. To make sure all the parts are in their correct position on the set up and when I am satisfied that everything is okay, I deem the assembly ready for the silver brazing operation.

In conclusion I think it's a fair comment to say that if you are silver brazing tubes into a copper boiler for the first time then the method as described is worth considering. I have used it myself over a number of years now, on a good number of boilers ranging from the smallest to the largest you could build to the AMBSC code (**Photos 3** and **4**).

Jim Carne's 11" Gauge Models

by Andrew Becker

Whilst fossicking through some old magazines in a local second-hand bookshop, I came across an early edition of *The Railway Magazine & Model Locomotive News* (**Photo 1**). It was an Australian periodical and is simply identified as No. 1, September 1933, Vol 1. I had never heard of this publication before but perhaps some of our readers know something about its history. One of the articles featured in the magazine is about a magnificent 11" gauge model of a Victorian Railways A2 locomotive built by Mr Jim Carne. A little research revealed that Mr Carne also built an 11" gauge model of S302 (*Edward Henty*). I found the story interesting so I thought I'd share it with your readers.

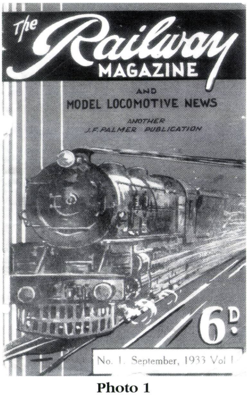


Photo 1

Born in 1890, Jim Carne lived in Maffra (Gippsland, Victoria) and worked as a motor mechanic in the Waugh Brothers garage (now a plumbing supplies). Jim apparently always had a passion for steam and during his time at Maffra built the 11" gauge A2 model described in the article (**Photo 2**). As Jim did not have any plans for the A2 he took measurements from real engines in the Warragul locomotive shed and then scaled them down. The magazine article states that the A2 model was 11'6" (3.5m) long, stood 3'6" (1.07m) above rail height, had a double riveted boiler of $\frac{3}{16}$" steel and had 24 boiler tubes (each $1\frac{1}{4}$" x 14 SWG). The tender held 13 gallons of water and injectors located under the footplate were used to feed the boiler. The fuel was coal and 75 psi steam pressure could be raised in about 25 minutes from cold. Jim did

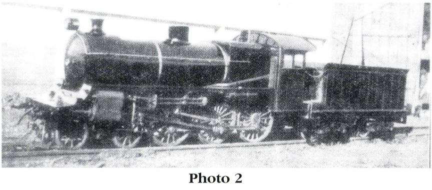


Photo 2

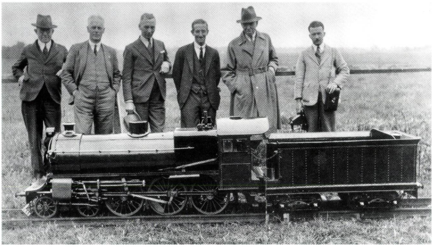


Photo 3 — *(From left) W.H. Deasey (ex-Metropolitan Rolling Stock Superintendent), N.C. Harris (former Chairman and Commissioner), M.J. Canny (Commissioner), Jim Carne, Sir Harold W. Clapp (Chairman of Commissioners) and A.R. Dabb (former tour clerk on Commissioners Tour Train)*

all of his own casting and he used a 4" Drummond lathe for all machining apart from the 12" diameter wheels. This was a truly remarkable model and took Jim 3 years to complete.

So impressive was this model that the Victorian Railways Commissioners (including Sir Harold W. Clapp) visited Jim's Maffra home to view the model during their eastern tour in September 1933 (**Photo 3**). At that stage Jim rented a room on a farm located about 1 km from the township on the Tinamba Road. The distant line of trees in photo 3 indicates the position of the Macalister River which flows through the town. I spoke to Mr Viv Lees from Maffra who remembers seeing the A2 operating on a circle of track laid in a vacant block adjacent to one of the churches in the town proper. This track must have been an additional track since both photo 2 and photo 3 were taken at the farm where Jim lived. The eventual fate of this fabulous model is not known, however Mr Lees thought that Jim sold it to a sideshow operator. Does anyone know where this model ended up?

Sir Harold Clapp was so impressed by the A2 that he sent Jim a complete set of drawings for the then new streamlined S class locomotive. Four Victorian Railways S class locomotives were streamlined in the early 1930's for the sole purpose of hauling the *Spirit of Progress* passenger train between Melbourne and Albury.

Jim eventually left Maffra and moved to Coburg (Melbourne) and became the head mechanic at Melford Motors. It was whilst living in Coburg that Jim built a magnificent 11" gauge model of S 302 (*Edward Henty*) (**Photo 4**). Jim finished the model around 1950 having taken 17 years to complete. **Photos 5** and **6** show the model inside Jim's workshop at his home in Bell Street, Coburg. This oil-burning model was also a monster being 12'6" long and 3' high above rail level. At some stage (possibly after Jim passed away in 1956) *Edward Henty* was overhauled and placed on a stand by apprentices at the Victorian Railways Newport workshops. **Photo 4** shows the model at Newport workshops in 1961 following the overhaul. The stand had an electric motor that enabled the driving wheels to rotate when a button was pushed.

The model was then sent to the Museum of Applied Science in Melbourne (now the Museum of Victoria) for display. Edward Henty was removed from display some time during the 1980's and has been in storage ever since. Recently I was fortunate enough to view the model in storage at the Museum of Victoria (Scienceworks at Spotswood). Unfortunately the boiler and some pipe work have asbestos cladding and the engine is completely cocooned in plastic. The Museum of Victoria has no plans to remove the asbestos and it is therefore unlikely that this model will ever be re-displayed.

Bibliography:

1. *The Railway Magazine & Model Locomotive News*, September 1933, Vol 1.
2. *Victorian Railways Newsletter* October 1958.
3. Extract from draft *Miniature & Amusement Park Railways in Victoria*, C. Holmes and P. Medlin, 11 March 1999.

Acknowledgements:

1. Mr Viv Lees, Maffra.
2. Public Records Office of Victoria (Photos 3,4,5 and 6).
3. Ruth Leveson, Head History & Technology Collections, Scienceworks.

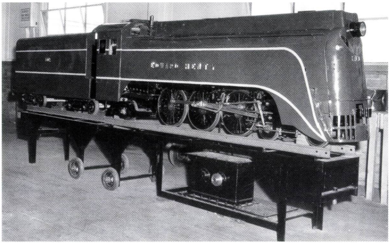


Photo 4

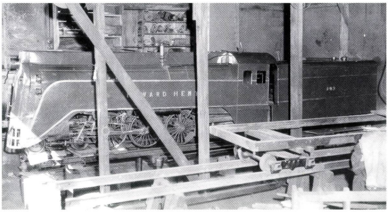
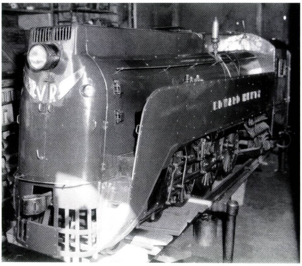


Photo 5



Garratt Gossip

A NSWGR AD60 Garratt in the U.K.

by John May

As a result of a photograph of my AD60 Beyer Garratt appearing in the *Garratt Gossip* special article in the 100th edition of *Australian Model Engineering* on the morning of 16th February, 2002, I received a surprising, but most welcome telephone call from John Cummings of *AME* in which John told me that during a conversation with the editor of *AME* the suggestion was made that I be contacted to see if I would be prepared to write an article under the heading "Why I chose to model an Australian Garratt".

I have to confess that the choice was not mine, but that of my eldest brother Henry. I feel sure that my brother's thoughts on the AD60 would have been very similar to mine. I believe that this particular locomotive had the most pleasing outlines of any I have seen. The fact that it had the biggest wheel arrangement of any locomotive produced by Beyer Peacock and was possibly the most powerful, made it a very desirable locomotive to produce in model form. In other words big is beautiful!

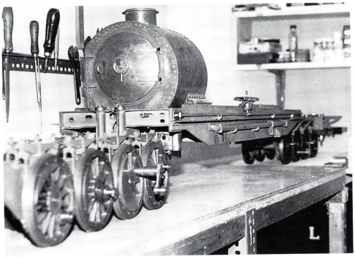
When I checked through the correspondence that I found in my late brother's workshop, I noted that he first started making enquiries about drawings or any relevant information on the AD60, early in 1970. The first contacts he made were with Mr Patrick, Chief Design Engineer at Beyer Peacocks Locomotive Division and Mr R A Johnson at the NSW Government Offices in London. Mr Patrick and Mr Johnson both advised that drawings were no longer available in this country but Mr Johnson confirmed that he had written to the NSW Department of Railways requesting any information they had on drawings. When it was confirmed in November 1970 that drawings were available from the NSW Dept. of Railways, Mr Patrick advised my brother on which drawings to select from the full list and in April 1971 he was the proud owner of 130 AD60 works drawings, for which he paid the princely sum of £38.52 ($82.55).

Henry started work on the AD60 in May 1971 but in the following years sustained several minor heart attacks, which slowed down progress considerably and in January 1979 he had a severe and fatal heart attack. The first of my photographs shows the progress he had made at the time of his death. The part built locomotive remained in my brothers workshop, untouched for almost 15 years. In October 1993 my sister-in-law agreed that she would give me the locomotive as it stood, very dusty, together with the drawings, on my promise that I would complete the locomotive in my brothers memory.

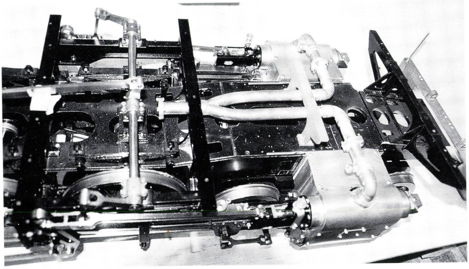
In the early stages of my part in the Garratt project I realised that I would have to decide whether to build a fully detailed glass case model or a slightly less detailed working model from which I could gain a great deal of pleasure driving it on various tracks. As I had no furniture in my home capable of supporting a 10 foot long glass case, complete with locomotive, I decided on the latter option. Another early decision I had to make was how I was going to drive it, with the boiler back head being 4 feet away from the rear buffer beam. Even with an engine of this size, sitting on a 5" gauge engine is not really an option, so I knew that I had somehow to extend the controls to a position closer to the rear of the engine and at a later stage in construction I decided to locate the extended controls on the coal bunker rear bulkhead. One of the design features of the AD60 which made extending the controls a little easier was the fact that having a smoke box regulator with external linkage, the drivers regulator lever in the cab had a fore and aft motion which made extending the regulator control straight forward.

As I am sure Aussie Garratt buffs are well aware the AD60 was equipped with the Hadfield Power reversing system. The idea of producing a reliable working power reverser in 5" gauge dimensions to be remotely controlled, I decided was far beyond my engineering skills. My only alternative solution to this problem was to design a conventional screw reverser to which I connected a dummy power reverser. Having installed a screw reverser in the cab, it was again quite a simple operation to extend the linkage and fit the reversing handle on the coal bunker bulkhead.

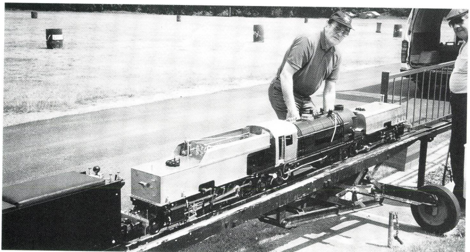
The engine frames in the prototype were a complete casting including cast in cylinders. To reproduce this in 5" gauge was



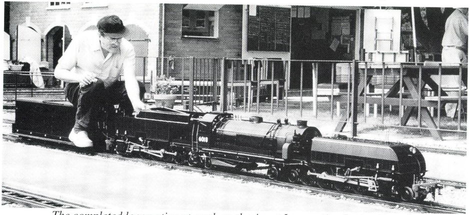
The loco as the author inherited it



Engine unit showing 5" gauge Springbok *cylinders with packing plate*



Note the remote controls and linkage, plus air controls on the riding truck



The completed locomotive at work on the Ascot Locomotive Society's track

obviously not a possibility so my brother fabricated the frames. This left me with the task of finding four cylinder castings that I could bolt on to the frames and which would correctly align with the connecting rod and piston valve linkage. Having scaled down the basic cylinder dimensions from my drawings, I checked through Reeves' catalogue to see if any of the cylinder castings they supplied for their various models had dimensions that were anywhere near a match to those that I needed. To my surprise, I found that the castings for their 5" gauge *Springbok* B1 Locomotive had dimensions that were almost identical to my scaled down ones. All I had to do was to fit a $^1/_4$" thick packing plate between the cylinders and the frames.

I gave a lot of thought as to how I was going to operate the brake cylinders and draincock cylinders on a bendy locomotive. My first idea was to make them steam operated, but I tried in vain to find a suitable small bore flexible connector (to connect to an $^1/_8$" inch diameter copper pipe) that would withstand the pressure and temperature of boiler steam. I then decided that I would have to make these cylinders air operated as on the prototype. I thought that a cycle pump connector would be suitable for providing a flexible connection at each end of the boiler frame but I was not sure what pressures they would withstand. However, my local cycle shop owner assured me that they were designed to withstand 160 psi. As my initial thoughts were that I would operate the brake and the drain cock systems at about 60 psi, I knew that the cycle pump connectors were the answer to my problem.

The next task was to provide a supply of compressed air. First I made a small reservoir from a 3" diameter piece of copper tube 12 inches long. I bought a small 12 volt battery and a 12 volt compressor designed for inflating car tyres. I fitted these three items into my driving truck with all the necessary connections and the safety devices and fitted the control valves to the front end of my driving truck. Once again I used cycle pump connectors to make flexible connection between the driving truck and locomotive.

Since completing the locomotive I have had the pleasure of one full season of driving. It's obvious with a locomotive this complex I have had to sort our a few teething problems. I am delighted with the way the engine runs and it has lived up to all my expectations.

In conclusion I would like to say throughout this project my wife has supported me, encouraged me, fed and even helped in the workshop, riveting the tanks for which I am very grateful.

From John Cummings —

It is a pity that John did not know about Peter Wardle's automatic cylinder drain cocks as this would have saved him a lot of time and work.

Regarding wheel arrangement, the Eas African Railways class 57 and 58 did have the same wheel arrangement as the NSW AD60 class, namely 4-8-4+4-8-4. As fo power (tractive effort), the Russian Garrat which had a wheel arrangement of 4-8-2+2-8-4, developed 78,700 lbs whilst the EAR class 59 developed 73,500 lbs against the AD60 (rebuild) 63,000 lbs. This information on the AD60 is taken from the book *The 60 Class*. In A E Durrant's book *Garrat Locomotives of the World* it is quoted as having 56,020 lbs tractive effort. *(The officia NSWGR figure is 63,000 ... Ed.)*

In issue #103 of *AME*, I asked did anyone know who was the builder of the Garratt displayed in front of Bob Brown' 2$^1/_2$" gauge 400 class. Well, in July, just before we moved, I received a call from Bob Brown to say the builder was Gavin Thrum of st Marys in South Australia.

I do not know about our readers but every time I receive a letter from overseas complimenting us on *AME* and/or *Garratt Gossip* it gives me a great feeling that we Australians can produce a magazine that is equal to or better than overseas magazines on similar topics. I realised this recently when I received a letter from Wolfgang Kargl of Austria who had been given an old copy of *AME* with the coloured centrefold of the Bush Mill Garratt. He wants to build the Tasmanian K class (the world's first Garratt), but in simple, not compound form, and was asking where he could get copies of the original drawings. Our editor advised me to contact Peter Manning who had recently visited the National Archives at Easter while in Tasmania. Peter was able to tell me that all Tasmanian Railway drawings are now on microfiche or film. Cost is 50c per photo or buy the roll for $30, then you will have all the drawings for K, L and M class Garratts. The person to contact is Mr Barry Paterson, National Archives, 4 Rosny Hill Road, Rosny Park, Tasmania 7018 Australia. Ask for Roll No. P1297-12.

Receiving this letter from Wolfgang brought back memories for me as he has built a loco in 5" gauge of a prototype that ran on the Zillertal Railway from Jenbach to Mayrhofen in Tirol and from Jenbach runs another line, the Achensee Railway. The Achensee Railway uses the Riggenbach system to climb grades of up to 1 in 6.25. The length of the line is just over 6k. In 1961 I lived in Jenbach right beside the line just where the grade started. The first time I heard this loco I thought that it was an express until I noticed that it is geared down 2 to 1 and it seemed to be crawling along.

My wife and I have now settled in our new address and our email remains the same, so there is no excuse for not emailing me with your articles.

You can email John on
jandpcum.com.au
or write to him at AME

Steam Chest

with Dave Harper

Hi there, steam fans, and welcome to another collection of condensate from the steam chest. Things seem to be doubling up on me lately — last issue I showed you a picture of the McNaught beam engine in Hobart. Well, recently I was sent some colour slides by friend Jim Libby, from his steam jaunt around Tasmania. Sure enough, there are some slides of the McNaught engine among them! As a couple of them show some details of the engine in reasonable close-up, I'll include them this time. (**Photos 1 and 2**)

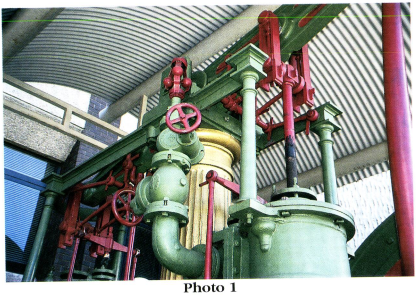


Photo 1

Another interesting item Jim spotted in Hobart was a steam crane on the dockside, shown in **photo 3**. Modelling something like that would be a real challenge! Jim also sent a number of slides of a steam railway crane that he saw at Strahan station. I'll put them in next time!

Anyone for a launch engine?

Looking through the pile of stuff that Jim Libby has sent me over a period, I realised that I've omitted to mention what may well be the most instructive set of notes and drawings of all! These come from a classic old book by William Ripper that was published in 1890 under the title *A Course of Instruction in Machine Drawing and Design for Technical Schools and Engineer Students*.

The 40+ A4 pages that Jim sent include dimensioned drawings for a twin cylinder launch engine and full notes on how it was designed. The most eye catching part of the whole set are the two beautifully tinted drawings of the engine and hopefully our kind editor will be able to reproduce them in colour (hint, hint!) **Figures 1 and 2** show them.

If any reader would like a set of these notes and drawings, a book of 10 x 49c stamps will get you a set. (Yes, I've finally run out of stamps!)

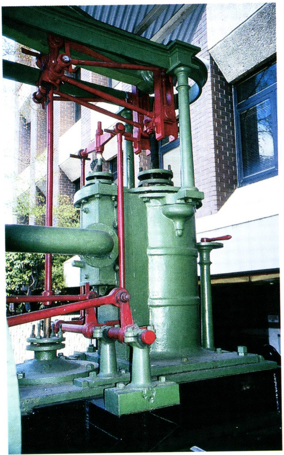


Photo 2

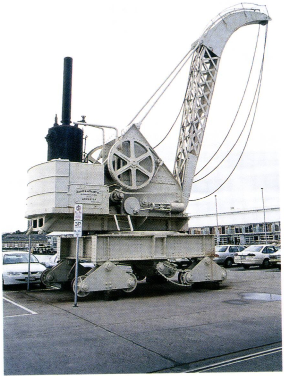


Photo 3

And now, double Tuxfords

A welcome visitor to the Boiler House a little while ago was John Carnsew, visiting from Cairns. A picture of John's collection of steam models was in *AME* a while ago (sorry John, can't track down which issue!) and he called in to discuss his latest project, a model of Richard Trevithick's Pen-y-Daren locomotive of 1803. John does like different models!

Anyway, in the course of conversation John showed me some other photographs of his models, including his model of the Tuxford steeple engine. This unique engine is part of the display in Newton Williams' steam workshop at the Swan Hill Pioneer Settlement in Victoria. John built

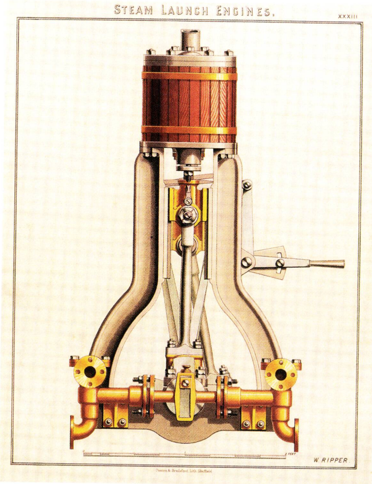


Figure 1

his model with photos of the original as his only guide. To match the forest of belts and shafts around that workshop John fitted his model up with its own layshaft and lathe to make a most attractive display. **Photos 4 and 5** show the set-up.

Imagine my surprise then, when a video tape arrived on my doorstep from none other than Newton Williams, showing his workshop in action, including the Tuxford engine! Newton must have poked his new video camera just about inside the casing of the Tuxford, as the crank and triangular shaped connecting rod show up quite well. This 30-minute or so video was a real eye-opener for me, never having ventured into the wilds of Victoria to Swan Hill. Thanks John and Newton for thinking of me, and our readers.

Incidentally, I queried whether 'his' Tuxford was the only one, and Newton assured me that it was the only single cylinder one in existence, but that there is a twin cylinder version at the other Victorian home of steam, Lake Goldsmith.

A double acting Dyson engine

Another interesting letter recently was from Ken McNeill from W.A. Ken wrote that he had recently taken up model engineering on retirement, after a working life in heavy fabrication. After taking a first year fitting and turning course at his local TAFE college, Ken's first model attempt was the original Rev Dyson's rotary valve engine (one of many) which was very successful.

Having seen all the other variations on that theme, Ken decided to have a go at his own version, making it double acting. Not only did Ken send some photos, but he included a complete set of drawings for reader's use. The following are Ken's notes on the engine:

'The basic difference being in the addition of a stuffing box and a steam inlet/outlet at the bottom of the cylinder. This arrangement works well at a minimum of pressure and is not as reliant on the flywheel as the single acting variety. An additional advantage is the number of working parts is not increased.

The main assembly is bolted together but any method will do and I have added flanges for disassembly ..... the piping and flanges are glued and the main inlet valve is only a temporary air inlet until the boiler is completed. The design is only for demonstration and I'm sure the weight can be considerably reduced. I am currently working on a 3-way valve and piping arrangement to reverse the motor.'

Photos 6 and 7 show Ken's engine with its temporary air valve and neat wooden base. **Photo 8** tells us that he has completed the boiler, and very nicely too!

Well done, Ken, and thank you, especially for the very professional looking drawings in **figure 3**. The reversing gear will be of interest when it's done, I'm sure!

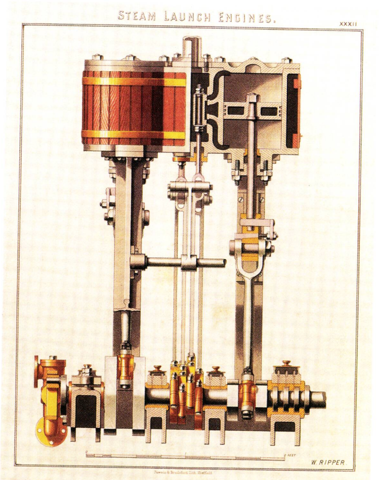
It looks like there's no end to the variations on the theme of these simple rotary valve engines — maybe we'll have to collect them all together some time in booklet form.

More on remote control sugar mill engines

The photo of the 'domed shaped gadget' on the Mossman mill engine a couple of issues ago has generated quite a lot of interest and correspondence. John Blaik works at the Millaquin Sugar Mill in Bundaberg, and contacted me by email. John informs me that although the Mossman engine is now gone, they still operate four reciprocators in the Millaquin mill, all by remote control.

Not only that, but John persuaded his friend Ross Driver to take some photos of the engines for us. As John told me, Ross is a very good photographer, and has won prizes for his work. That I can believe, having studied the photos. Anyone who has experienced the lighting (or rather, lack of it) and

Figure 2



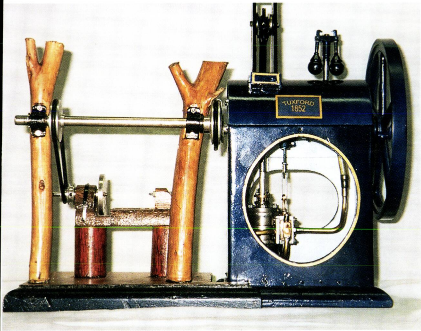


Photo 4

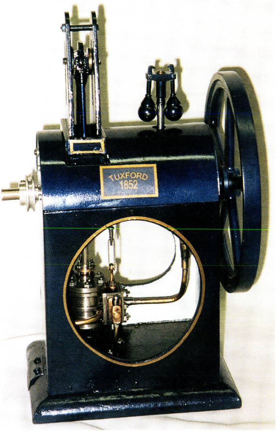


Photo 5

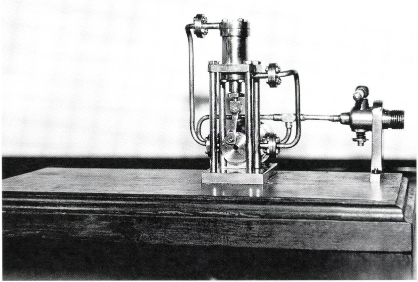


Photo 6

general conditions inside a working sugar mill will tell you that photography is extremely challenging in there. I discovered this myself in 1995 when I was lucky enough to be taken into Maryborough Sugar Mill to photograph their last reciprocator.

It seems that to remotely control one of these old engines is quite a challenge — there are cylinder drain cocks to open and close, the position of the valve gear must be sensed and the valve gear shifted to the required position for starting, stopping etc. There has to be a speed sensor on the crankshaft and some means for controlling the engine speed automatically while running under load.

Taking things in order, **photo 9** shows one of the remotely operated drain valves, all driven by compressed air, incidentally. **Photo 10** shows the sensors on the Stephenson's link gear, **photo 11** shows the two air cylinders that have replaced the rack and pinion valve operating gear. The encoders on the end of the crankshaft are in **photo 12** — as John comments "A bit dirty" EVERYTHING in a sugar mill gets more than a bit dirty!

The electronic governor has been hooked up in place of the original Pickering governor in **Photo 13** — doesn't look nearly as elegant!

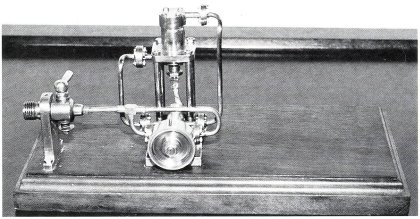


Photo 7

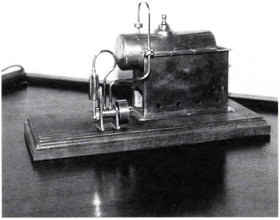


Photo 8

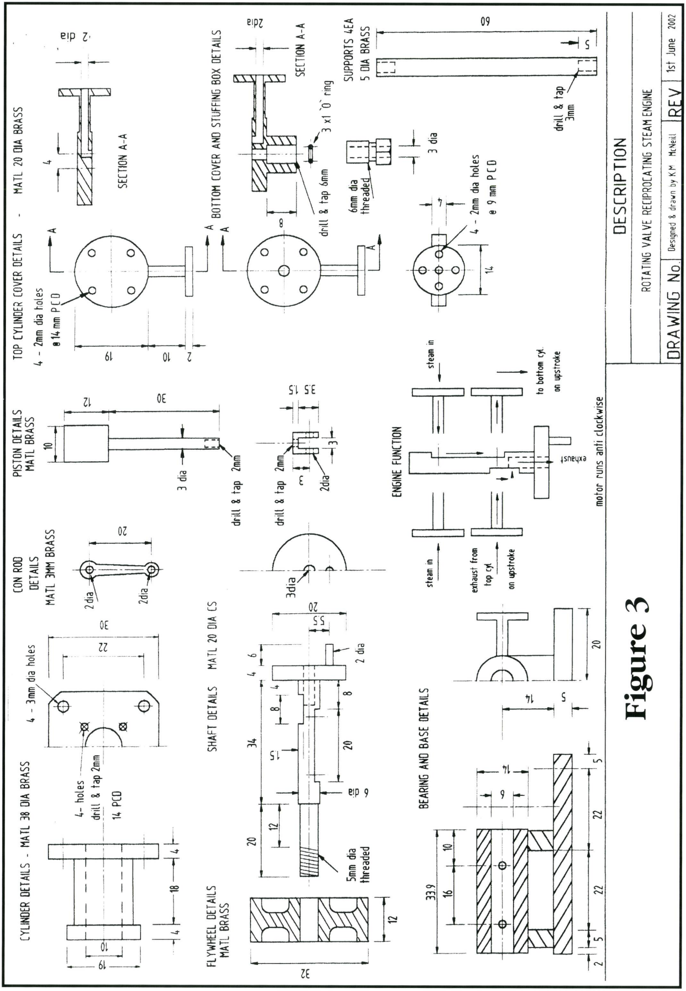

CYLINDER DETAILS - MATL 38 DIA BRASS
4- holes drill & tap 2mm 14 PCD
4 - 3mm dia holes
CON ROD DETAILS MATL 3MM BRASS
2dia
PISTON DETAILS MATL BRASS
3 dia
drill & tap 2mm
TOP CYLINDER COVER DETAILS - MATL 20 DIA BRASS
4 - 2mm dia holes ø 14 mm P C D
SECTION A-A
2 dia
FLYWHEEL DETAILS MATL BRASS
SHAFT DETAILS MATL 20 DIA CS
5mm dia threaded
6 dia
2 dia
3dia
drill & tap 2mm
2dia
BOTTOM COVER AND STUFFING BOX DETAILS
drill & tap 6mm
3 x1 `O` ring
2dia
SUPPORTS 4EA 5 DIA BRASS
drill & tap 3mm
BEARING AND BASE DETAILS
ENGINE FUNCTION
steam in
exhaust from top cyl on upstroke
exhaust
to bottom cyl. on upstroke
motor runs anti clockwise
6mm dia threaded
3 dia
4 - 2mm dia holes ø 9 mm P C D
DESCRIPTION
ROTATING VALVE RECIPROCATING STEAM ENGINE
DRAWING No.
Designed & drawn by K M McNeill
REV
1st June 2002

Figure 3

Photo 9

Photo 14 is a brilliant shot of the computer screen at the operator's station (in the air conditioned, sound proofed control room) for starting and operating the crushing station. Steam has truly gone high tech here!

And finally, some shots of the actual engines! No 2 engine is shown in **photo 15**, and engines 2 and 3 are shown in **photo 16**. These engines were built by Walkers of Maryborough in 1964 and 1965 respectively — surely among the last of their breed to be built. This last photo also shows a peculiarity of all Walkers' mill engines, the piston tail rod running in its own slide. This presumably is to take the weight of the piston off the cylinder walls, but I'd be interested to hear comment from someone in the know.

The engines are typically about 24" bore x 48" stroke, with large piston valves. These features are common to our mill engine at the Boiler House, which was built in 1926 by Stewarts of Glasgow for the Moreton Mill in Nambour, Qld.

Mystery engine identified?

Another email recently received was from Ken Burge of Melbourne. Ken thinks that the twin cylinder marine engine of David Dettmar, pictured in photo 10, page 18 of issue 103 looks very much like the Stuart Turner No 3 compound engine in an old catalogue he has, dating from 1926.

The cylinders of this model were $1^{1}/_{2}$" and $2^{1}/_{4}$" bores x $1^{1}/_{2}$" stroke. The catalogue picture showed the name 'Stuart' cast on the front of the sole plate. The kit of castings, weighing 37lbs cost four quid back then! Apparently that model doesn't appear in the 1933 or later catalogues.

I've passed that information on to David Dettmar, who sends his thanks, Ken. He maintains that there is no Stuart name on any of the castings, though.

Steam on the Net

Ian Holt emailed me with details of a very interesting web site — www.binternet.com/~historical.engines/

This site gives details of the amazing models built by David Hulse and used to illustrate his series of articles on Early Development of the Steam Engine. This series has now been produced in book form under that title, as well as a follow up book called The *Development of Rotary Motion by Steam Power*.

In his search for authenticity, David Hulse produced thousands of scale bricks to build the engine houses for his models! The seven models are pictured and described in detail on the site - well worth a look. I think you can even order a copy of the book there as well.....thanks for tip, Ian.

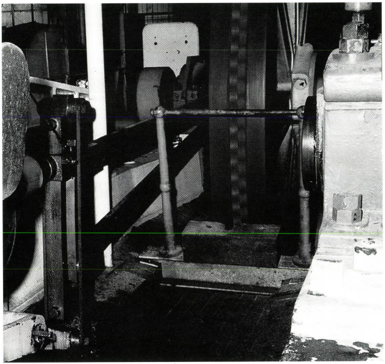


Photo 10

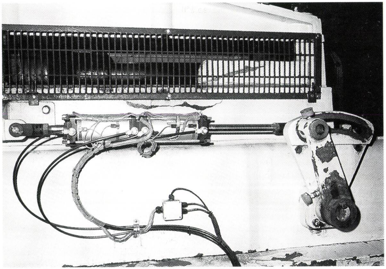


Photo 11

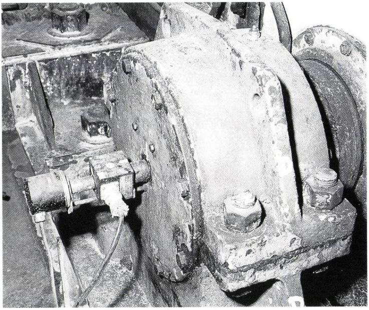


Photo 12

Huxtable hot air engine clarified

In the July/August 2002 (No 103) *Steam Chest* there was a picture of an interesting hot air engine belonging to Clinton Taylor (photo 6, page 17). It was apparently made by Peter Olds of Maryborough, and I asked if Peter could tell us more about it. Sure enough I received a phone call from Peter who told me that he'd been tipped off about my query by a friend of his in Mt Isa!

It seems that Peter originally built this engine for his friend Robert Huxtable, a hot air engine aficionado o Lansing, Michigan, USA in 1978. When Rober visited Peter that year and was presented with the model as a gift, he asked Peter if he could produce a batch of them for his friends back in the USA.

Since then apparently Peter has been producing the engine in limited numbers to meet the demand. The sample I saw on my visit to Peter's museum back in 1995 had a parabolic reflector mounted around the hot end, and the drive was used to power a fan. This model is still available, Peter told me. What's more, Queensland University are experimenting with a larger version, scaled up from the 1" bore to 4" bore, to generate electricity from solar power using improved reflectors. It seems that the bigger version can produce up to 1kW of power.

After a long and pleasant chat with Peter, he promised to send me a leaflet he has produced on the Huxtable engine. This booklet includes a reprint of part of an early catalogue of Rider-Ericsson hot air pumping engines, supplied by Robert Huxtable — a nice touch!

Anybody passing near Maryborough should make an effort to call at the Olds museum at 78-80 North St, I found it fascinating. Alternatively, copies of the booklet are probably available from Peter Olds at PO Box 30, Pallas St., Maryborough, Qld, 4650 at a modest cost.

Thank you for your trouble, Peter, I must make another trip to Maryborough and write up the replica of the *Mary Ann* steam loco.

That seems to be more than enough for this time, until next time, happy steaming!

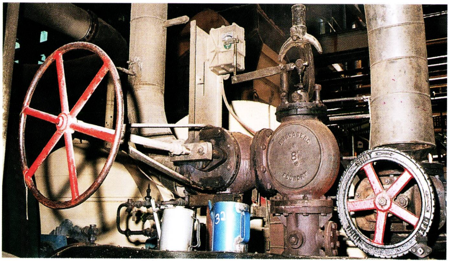


Photo 13

Photo 15

You can email Dave at:
sandave@bytesite.com.au
or write to him at AME

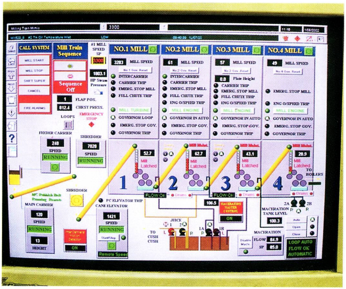


Photo 14

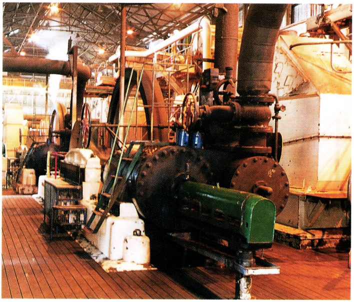


Photo 16

Euroa Celebrates

by David Proctor and Murray Hill

Photos by David Proctor

The second last weekend of August was a very special one for the members of the Euroa Miniature Railway in the town of the same name in central Victoria. The official opening of their new covered round house coincided with the handing over to the club of his last locomotive by the club's greatest stalwart, Ted Murrell. It was also taken as an opportunity to thank Ted for what he has done over the years and to celebrate his achievements and friendship.

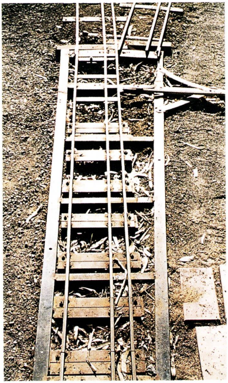
The new round house offers protection from rain and the summer sun

The members could not have wished for better weather - both days were absolutely glorious early spring days. People began arriving from various points around Victoria on the Saturday for a nice afternoon of socializing and early steaming followed by a great meal at the Euroa Hotel. An early start for some saw locos on the track while it was still fairly cool on Sunday morning, before the sun got up very high. During the morning visitors continued to arrive, with the largest contingent being a small bus load of 11 from Cobden.

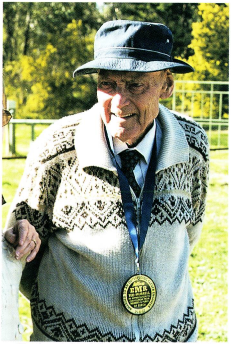
People continued to run their trains or enjoy themselves otherwise in this relaxing setting until around 2 o'clock when the official proceedings were commenced by club secretary (and Euroa Town Crier) James Carter. The Mayor of the Shire of Strathbogie, Graham (Mick) Williams then gave a short address and declared the new

The station/club house shares an idyllic setting with some magnificent red gums

James Carter drives the loco which Ted has given to the club



EMR station — Ted's caterpiller points featured in AME a couple of years ago



The face behind the name — Ted Murrell

Ross Setford had a great weekend with his Bagnall Carmen *and scale train*

Some of the locos built by Ted Murrell which were on display

round house officially open. During his address he mentioned his own association with the club and that he was the council grader driver who did the earthworks for the round house site. There was a special presentation to Ted Murrell from the members and the already mentioned handing over of his last locomotive. This was followed by brief addresses from David Proctor (AME) and Murray Hill (AALS) on Ted's contribution to the hobby over the years.

Ted Murrell

Most readers of AME will be very familiar with the name Ted Murrell (or E J Murrell) as Ted has been a regular contributor of articles and small filler items for most of the life of the magazine. Briefly, Ted is a mechanic and after working in a variety of places around Melbourne and Gippsland for many years he eventually moved north to Nathalia for health reasons. Here he began in the motor industry, eventually acquiring the local agency for Vanguard cars and later the Toyota agency, which were eventually passed on to his sons.

As a miniature locomotive builder he has not been content with just building to plans but has used his ingenuity to also design and build his own and to date has upwards of 20, now scattered around the country. Of course, when one builds locomotives they need the rolling stock to go with them and the track for them to run on and he has also been prolific in these areas. His designs all have a high level of safety built in, reflecting his strong interest in safety issues.

He was the driving force behind clubs in Nathalia and Euroa, the Nathalia track and club being almost a single-handed effort. In the early 90's he moved to Euroa where he established the Euroa Miniature Railway which was officially opened in October 1994. Some people were saying on the weekend that Ted is 90 years old. He says he only feels about 50 and anyway, he doesn't turn 90 until after Christmas. He continues to send articles to AME so readers will see the name of Ted Murrell for some years yet before he retires!

Netta remains a fine design. Unfortunately, I didn't get the owner's name

Len Stampton brought his QR 'Pompey' up from Melbourne

American Railways of Note

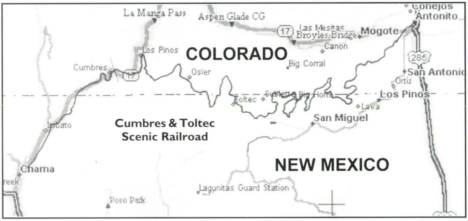
2. Cumbres & Toltec Scenic Railroad

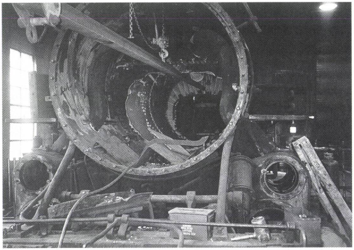
by Murray Lane

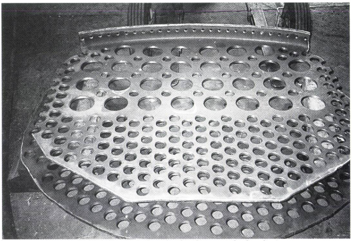
History

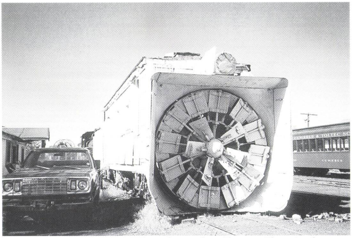
The Cumbres & Toltec section of the railway, opened in 1880, and is an archetypal remnant of the Denver and Rio Grande Railroad Company railroad system. It was originally constructed as a part of the Rio Grande's San Juan Extension, which served the silver mining district of the San Juan Mountains in southwestern Colorado. Gangs of French Canadians worked for over a year to lay the winding 64 mile track from Antonito, Colorado to Chama in New Mexico, through the Southern Rockies. The narrow gauge railway was constructed with a three-foot gauge to allow the trains to handle the sharper corners and steep slopes encountered along the trip, and also to save time and money.

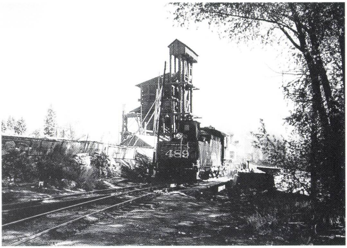
The inability to interchange cars with other railroads led the Rio Grande to begin converting its tracks to standard gauge in 1890. However, with the repeal of the Sherman Act in 1893 and its devastating effect on the silver mining industry, traffic over the San Juan Extension failed to warrant conversion to standard gauge. Over the ensuing decades it became an isolated anachronism, receiving its last major upgrades in equipment and infrastructure in the 1920's. A post World War II natural gas boom brought a brief period of prosperity to the line, but operations dwindled to a trickle in the 1960's. Finally, in 1969 the Interstate Commerce Commission granted the Rio Grande's request to abandon its remaining narrow gauge main line trackage, thereby ending the last use of steam locomotives in general freight service in the United States.



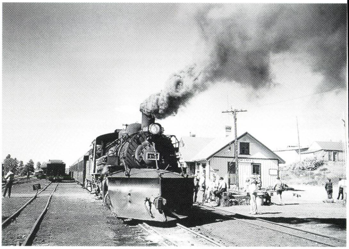

A view inside the boiler of a K36 under major repair in the workshop


New tube plates for the boiler, ready for fitting


An OM rotary snowplough in the yard at Chama. There is also a similar looking OY unit, both of which are steam powered.


K489 under the coal tipple in Chama, which was built in 1924

A traditional view of K489 in the early morning sun outside the engine shed at Chama



The train at Chama station waiting for K489 to back down to couple up to K487

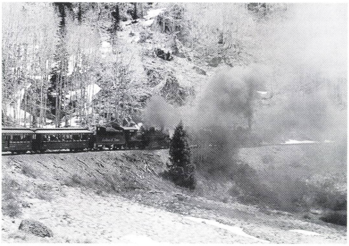
Most of the abandoned track was dismantled soon after this decision, but the most scenic portion of the line was rescued from extinction by the combined efforts of a group of citizens and the governments of the two states through which it runs. In 1970, legislatures of Colorado and New Mexico established a joint railroad authority, purchasing the line and equipment for $547,210. Three years later after much negotiation and repair, it emerged as the Cumbres & Toltec Scenic Railroad - the longest narrow gauge railroad in the United States, crossing the Cumbres Pass at an altitude of 10,015 feet.

The entire railroad is desgnated a National Historic Site and is described as one of the most spectacular examples of railroading in the North America. This unusual train trip features fantastic geological displays as it winds its way through tunnels and cuts above the Toltec Gorge. During May through October it carries over 50,000 railroad fans and friends through land the Spanish called 'La Tierra Maria'. It is little changed from the days when it was built. The trains are pulled by original Rio Grande steam locomotives, and the railroad has over 100 historic freight and maintenance-of-way cars, some dating back to the 19th century.

K489 has split from the train and passed over the Lobato trestle on it's own due to loading restrictions

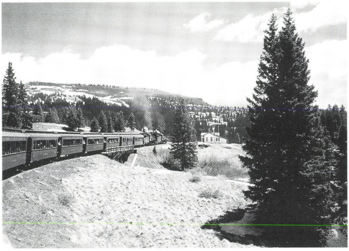
The two engines are starting to work much harder as they swing round a bend lined with aspen trees.

A view forward from halfway back on the train where the steep grade is very apparent



The firemen will be earning their money now with the engines working hard on the 1 in 25 and on the tight 180° curve at Loxo

Another view from the rear of the train as the snow becomes more apparent further around the Loxo bend



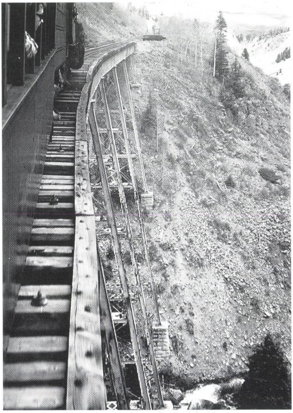
In this shot the engines are just reaching the top of the Cumbres Pass

Route

The line leaves Chama (a small town in the Chama Valley some 155 miles from Albuquerque), at an altitude of 7863' and climbs 2152' towards the Cumbres Pass in Colorado, in a northeast direction on a heavy grade which gradually increases to 1 in 25. The two notable features in this climb of around 7 to 8 miles, are the bridge at Lobato where one of the two locomotives (required to pull the 500 passengers), is split from the train to cross the bridge on its own, and the large loop at Loxo. As the line climbs, the trees seen are Ponderosa pine and aspens. Further up Douglas fir begin to dominate and at the top the Engleman spruce treeline is approached. At Cumbres one locomotive is once again split off the train, as it is not required on the down hill grade to Antonito. Another large loop at Los Pinos is negotiated before the train reaches Osier where it stops for an hour. When the train from Antonito arrives, the locomotives swap trains, while passengers have lunch in the large dining room. From Osier the line continues downward high up on the northern side of the Toltec Gorge with the Los Pinos river far below. The track runs on a narrow ledge carved out of the side of the gorge, and passes over several bridges and through some short tunnels on this section. After passing through the gorge, the line drops through a series of wide, looping curves and switch backs off the mesas, until it reaches the high desert floor of the San Luis Valley. Here the landscape is treeless with most of the vegetation being sagebrush and cactus, with the last 3/4 of an hour of the trip being somewhat boring until it reaches Antonito depot at an altitude of 7888'. The line crosses the New Mexico Colorado border several times during its torturous route.

General

For the railfan this is one of the best rail trips available. Chama is the end to start from, as the grade is much steeper



One of a number of trestle bridges

K489 has been taken off the train as it starts down the other side of the Cumbres Pass towards Antonio

A view of Osier with the train from Antonio waiting for the Chama train to arrive

The terrain looking down into the Toltec Gorge from the train

The view from the train near Big Horn

and the two engines work extremely hard. The train leaves at 10.30am, but get there early as unlike Durango, the public is allowed to wander around the depot. There is a lot to see including the overhaul shop and the various wagons and engines. If you go early in the season there will plenty of snow around. If you go in autumn the aspens and other deciduous trees will be in full colour. Keep a good look out while on the train as there are antelope, bear, bobcat, deer, coyote, fox and puma and many kinds of birds are to be seen.

The trip takes around 7 hours and transport is available by road back to Chama. Highway 17 follows the line more or less to Los Pinos for those who would like to take ground to rail photographs.

Prior booking is required, and there are many sites on the Internet. The official web site is www.cumbrestoltec.com

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Universal Test and Demo Stand for Locomotives — part 1

by Peter Dawes

Drawing for publication from the author's original by Rex Swensen

(This is the beginning of a short construction series which will be continued over the next two or three issues ... Ed.)

Have you ever been busting to test your new loco and the track was too far away or the weather was too hot, or it was snowing, or raining, or the wife had the car? This universal testing stand (UTS) solves the problem. As a bonus, it can serve as a construction stand for superstructure if placed onto a suitable table.

Special features

1. The test stand allows a stationary loco to run just as if it was on a track. The leading and trailing wheelbases are adjustable by means of hand-wheels to suit different locos, and there is an accurate display of those lengths for setting up purposes.

2. It has "rail inserts" or segments of rail between the rollers to allow RO-RO (roll-on roll-off) operation and simplify setting up.

3. A drive system can be added to provide any mode of operation - "Demo", "Test", or "Dynamometer".

4. It boasts a system whereby only a small adjustment of chain length (less than 10%) is required to accommodate a large change in wheelbase.

5. There is an optional 4:1 reduction stage built in to the drive. Users can include that or leave it out depending on their needs and the motor used to drive it.

6. There is a removable hand crank to inch the rollers round for positioning valve gear, etc.

Difficulty rating

Moderately difficult, involving many workshop disciplines especially including careful arc welding, laying out and measuring, and some silver soldering and keyway cutting. I found it harder to make than it looked at first sight but attention to the procedure, especially the order of operations, and to stated dimensions will ensure that it is easier to make than a loco chassis. It took me eight weeks to design, build and write it all up. Construction alone should take less than four. Adding a motor drive will be extra.

Units

Mixed units have been used since steel is sold in metric but locos are still measured in Imperial. Water pipe and keyway broaches are Imperial as are chain and sprockets. On the other hand metric bearings are commoner and cheaper than Imperial.

I happen to have access to both Imperial BMS and metric round steel so I have mixed them as I found necessary.

All my reamers are Imperial. To have bought a set of metric ones would have cost well over a hundred dollars.

Introduction

The stand is designed as a universal machine that can be adapted to perform in one or more of three ways, and users can choose accordingly:-

(1) It can provide a demonstration of a loco with its wheels moving under external power (Demo mode);

(2) Test a loco driven under steam or on air (Test mode);

(3) Act as the base for a dynamometer, including measurement of drawbar pull (Dynamometer mode).

The literature contains relatively few locomotive test stands and of those, the one by W. Shellshear (*AME*, January 1989) is the closest to what I had in mind. However his design is not suitable for the present application because:-

(a) it was not designed to drive the loco (i.e. be "active").

(b) the rollers are only 2" diameter. Admittedly it was designed originally for a 3½" gauge loco, but it must be fiendishly difficult to balance a heavy loco on 2 inch rollers while setting up the front and rear stops.

(c) Lastly, it does not provide for adjustable wheelbases (W/B's), nor for "rail inserts".

What his machine does have is a simple and elegant strain gauge to measure drawbar pull. A strong leaf spring deflects according to the pull. T he deflection is measured by a dial indicator and the device is calibrated by hanging weights from a chain attached to the spring and passing over a pulley.

His machine also had a sturdy brake to apply a variable load to the loco. It also had simulated inertia created by two heavy flywheels. But more about that later.

One test stand design used gears to link the drive wheels (A.W. Smith; *ME*, 3rd Sept 1956). It was much too cumbersome and restrictive. Gears become impossibly difficult for large wheelbases although if properly set up they would have a high transmission efficiency.

The design presented here uses a chain drive that can either transmit a drive to the loco via an electric motor in order to create a moving demonstration - "active mode" - or it can be used in the "passive mode" - where it is driven by the loco powered by steam or compressed air. This version of the drive can be extended so that the loco drives a generator for power measurement (Dynamometer mode), and/or it can be used to measure drawbar pull via a strain gauge. The loco can be "loaded" as required, by an electric generator or mechanically with a brake. Just turning the optional 4:1 reduction stage adds a certain fixed amount of loading automatically.

The design presented here is essentially the base machine. It does not try to cover all the drive possibilities. Builders are referred to Shellshear for the strain gauge and to other references for dynamometry.

The initial reaction when starting out to design a test stand is to try to arrange it so as to put one pair of loco wheels in the vee formed by a pair of closely spaced rollers. This is intrinsically stable. Unfortunately it has three drawbacks. Firstly, the depth to which wheels drop in between the pair of rollers depends on their diameter so other drivers have to be adjustable vertically as well as for the wheelbase. The second reason is that there is another roller to be driven. The third reason is that it is no longer possible to measure drawbar pull.

So we must accept that the loco has to be balanced on top of single rollers, and while that arrangement is intrinsically unstable, it is workable as long as the loco is held firmly in position lengthwise.

Overview of machine

1. The **frame** of the machine consists of two 3mm thick rectangular side plates. On each of these is attached an "axlebox guide frame". Two side "cover plates" close off those guides. Spacer tubes and tie rods hold the sides together and a pair of angles form its "feet".

2. The **drive** mechanism consists of three main axles driven by sprockets, with a system of 6 idlers. The rearmost idler is adjustable to control chain tension. The front idler is fixed and is the point at which power is put into or taken out of the system. The chain drive system is mostly mounted on the LHS frame plate. There is a step-down reduction stage of about 4:1 to slow down a motor drive if required.

3. An **axlebox positioning system** moves and controls the position of the axleboxes in the guide frames and thereby adjusts the wheelbases. One set varies the

front W/B distance, the other the rear. The screws that move the axleboxes are linked by a small-pitch chain so that the axleboxes on the two sides travel exactly in synchronism. Pointers on the axleboxes indicate on scales the exact length set on the wheelbases.

4. The ideal **motor drive** had not been found by the time the unit was built. There are many options so this is left to the discretion of the builder — but see the comments later.

Specifications

LENGTH: The main frame is 50 inches long to accommodate up to a NSW C38 Pacific type 4-6-2 loco when built to a scale of $1^{1}/_{8}$" to the foot. This model has over 6" diameter driving wheels. Add 4" to that for the o/a length with hand wheels.

Wheelbases: The front and back wheelbases are independently adjustable ($4^{1}/_{2}$ - $8^{1}/_{2}$" and $4^{1}/_{2}$ - $9^{1}/_{2}$" respectively) so that it will accept an 0-4-0 up to a 4-6-2.

It is not primarily designed for an x-8-x or a Bo-Bo or a Co-Co although there is no reason why one bogie of a Bo-Bo or a Co-Co could not be put on the machine with the other one carried at the rear on an auxiliary stand such as one made for a tender with passive (idling) rollers.

For a X-8-X, a fourth axle can be accommodated - with certain restrictions. Firstly the rollers are idlers and not linked into the power train. Secondly, each side is adjusted independently for wheelbase. This is called the "fourth axle roller".

The 4th axle rollers are only about $2^{3}/_{4}$" in diameter. A slotted bar bolted to the side frame allows for manual adjustment of the wheelbase on each side independently. Positioning and attachment of the fourth axle assemblies are simple because each carries its own built-in "rail insert", fitting in place of the static rail inserts. It can be located wherever the wheelbase dictates and wherever there is room.

On the same principle it is possible to accommodate a ten- wheeler by putting one idler axle in front and a second one at the rear. Whether they will fit any particular locomotive will depend on detailed measurements. I haven't investigated this for the present design.

Wheelbase adjustment range: The front and rear wheelbases are adjustable at the front from a minimum of $4^{1}/_{2}$" to a maximum of $8^{1}/_{2}$", and at the rear from $4^{1}/_{2}$ to $9^{1}/_{2}$". These dimensions were chosen arbitrarily. There is nothing to stop them from being increased. Note that the ends of this device are interchangeable. The definition of "front" and "back" is arbitrary, but for descriptive purposes front is defined as the one with the shorter w/b adjustment. Left and right sides follow from that. Most three-axle (x-6-x) locos tend to have unequal wheelbases with the longer one at the rear. The NSW C38 is an exception insofar as its leading and trailing wheelbases are equal. The C36 has $6^{1}/_{2}$ and $8^{1}/_{2}$" wheelbases respectively.

Tender: The stand is not meant to carry the loco tender as Shellshear's machine did. That would make it quite unmanageable for larger 5" gauge locos, but a simple auxiliary stand of the same height without rollers could be made as a separate item and flexibly linked to the main one for "demo" mode operation if required. The fixed rail inserts at each end of the stand have been made extra long to overhang the controls on the ends so that a continuous rail is provided to join up with any extension.

Weight without extras and without a motor or its drive parts, is approximately 110 lbs or 50kg. A motor drive could add another 20lbs (10 kg).

Gauge: The track gauge is fixed at 5" but the use of spacer tubes and tie rods to join the two sides means it is not difficult to redesign it to another gauge by changing the spacer tube length and the axle lengths. Five of the six chain idlers are on stub axles and will not need changing. Four shafts, the input/output shaft and the three main roller axles would have to be changed to fit the gauge. The fourth axle assemblies are universal — they fit any gauge.

Bear in mind that changing up to 7 $^{1}/_{4}$" gauge would require general beefing up of the whole design as well as an increase in the length. Gauge, overall length, roller diameter, and similar dimensions change up or down linearly. But weight is going to change as the cube of the gauge so that a seven and a quarter gauge loco will weigh 7.5 cubed divided by 5 cubed or approximately 3 times as much as the equivalent 5 inch model.

Wheel (roller) diameter: The wheels, henceforth called "rollers", are nominally $4^{1}/_{2}$" diameter. They are fabricated using ordinary iron pipe ($4^{1}/_{2}$" OD or nominal 4" water pipe). Mine finished at 4.485". If the builder is prepared to oxy - cut discs out of $^{3}/_{4}$" plate or buy commercially cut discs sliced off a billet, then he could choose his own diameter, and of course, some other dimensions would have to be adjusted on the design especially the distance of the axle centres below the top of the frame.

Bogie wheels: are not driven, although they are supported on rail at the same level as the rollers.

"Rail inserts"

"Rail" is provided at each end and in the gaps between wheels to support bogies and to allow a loco to be rolled onto the stand from either end. Permanently fixed rail pieces can be put on each side of the centre roller to a width equivalent to two roller diameters. Fixed rail can also be put at each end. Different sized segments are required to fill the gaps in between according to the particular wheelbase (W/B) that is set.

Having an adjustable W/B means that the pieces of rail must be cut to the length to suit each particular job if the gaps are to be filled completely. I could find no more elegant solution to this problem than just cutting pieces as required. If users do want the intervening rail, and it is recommended, the pieces must be cut to suit the loco and fitted in place with bolt holes at modular intervals of 1". Gaps in the rail up to about 1cm are acceptable for large wheels so it is possible to get away with a relatively small number of pieces. In any case most users will be working with only one or two locos and once the pieces are cut for these, the sets of four pairs required for a given x-6-x can be readily exchanged.

The rail inserts are simply 50 x 5mm flats bolted onto the top of the side frames of the stand. Their inner edge forms the rail. They are not difficult to make except for the bevelled ends that abut the rims of the rollers. This angle is preferably about 30 degrees to match the roller profile but I ended up compromising on 45 degrees because of the difficulty in cutting 30° angles.

Stops

Rigid stop posts are inserted in square tubular "stanchion sockets" on each corner for fixing the loco firmly endwise to stop it running off its rollers. A second set of sockets is fixed some 6" in from each end to cater for short locos. A cross beam is bolted to these stanchion posts, and it can be fitted either on one side or other of the post to provide an extra inch of adjustment, either front or back.

The equipment required to actually fix the position of the loco is carried by the crossbeam and is not detailed here because it can vary according to buffer height and separation, and whether the buffers themselves are to be used, or the buffer beams, or the hook, or even an auto coupler might be used as the attachment point. I use welded link dog chain with $^{3}/_{4}$" x $^{1}/_{2}$" links of 2.5mm gauge steel.

Fixing: can be in compression or in tension (i.e. push or pull) but:-

(a) The same system must be used at each end.

(b) "Pull" is preferable for spanning long distances.

(c) If buffers are included then they must be compressed.

(d) No slack is permissible.

(e) There must not be any "elasticity" except in the special case of measuring drawbar pull. Otherwise oscillations will be set up and if that happens for any reason whatsoever, the solution is a damper in parallel with the fixing system and tuned to the specific conditions of mass and frequency. But this subject takes us outside the intended scope of the present article.

(f) The point of attachment on the LOCO in "pull" should be at or just above the height of attachment on the test STAND.

(g) In "push" it should be at or slightly below.

(h) Pull and Push should be close to the centre line of the loco so there is no sideways force. Alternatively, the force should be applied to both sides evenly.

The distance between the outer stanchions with the cross beam on the INSIDE is 46$^{5}/_{8}$" and approximately 48" if it is placed OUTSIDE.

An example of a typical loco is the NSW passenger C36 with 4-6-0 footprint. The buffers are 6.0 inches apart and 3$^{3}/_{8}$" above the railhead. Built to a scale of 1$^{1}/_{16}$" to the foot, its driving wheels are 6$^{1}/_{8}$" over the treads.

It is about 38" long between b/beams to which is added an extra nominal 2" if buffers are included, making it then about 40" long between fixing points. The front W/B is 6$^{1}/_{2}$". The rear is 8$^{1}/_{2}$". Distance from front b/beam to 1st axle is 19.5". Remembering that the main driving axle of the test stand is at the halfway point of 25" from either end, it will be necessary to add $^{3}/_{4}$" to the front spacing by putting the crossbeam on the outside of the posts at the front. The distance of the rear axle to rear b/beam is 15$^{1}/_{2}$". These distances might be set up using the end stanchions at the front with the crossbeam on the OUTSIDE, plus the end pair of stanchions at the rear with the crossbeam on the INSIDE.

Finally, if there is even the slightest doubt about the reliability of the "fixing", add a second stop that will guarantee that the loco cannot escape off the stand in Test mode.

Simulated inertia as used in the Shellshear design is NOT provided in this design. The idea is to put rotational momentum into the drive that equates to the linear momentum (mv) of the moving loco and thereby simulate the conditions it would operate under if it was moving on a stationary track.

Inertia is desirable but can only be added in a limited form for reasons that will emerge. Even if fitted it would not be easily changed for different loco weights without adding outrigger axles and these are not proposed for this design.

Inboard mounted flywheels to give inertia require fixed 4" diameter weights added to one or more of the axles. My calculations using the Shellshear formula suggest that the flywheel to simulate a 150lb loco on this machine would be impossibly large and heavy. The reason it works on Shellshear's machine is that he uses very small (2") rollers. They rotate faster and the inertia varies with the square of the diameter according to his formula. The formula he used is:-

$$T = \frac{9xWxd^2}{NxDxDxDxD}$$

where T = thickness (i.e. length) of "flywheels", W = weight of engine and any load, d = diameter of rollers under engine, N= number of flywheels, D = diameter of flywheels. All units are lbs and inches. The formula is for steel flywheels. For cast iron change the constant "9" to "9.7".

While the calculated flywheel size is impractical on this machine, it is still a good idea to include some inertia. It needs to be planned at the beginning and incorporated during initial assembly. While the rollers themselves could be made of solid $^{3}/_{4}$" plate, any extra flywheels would be limited to one on each axle, 4$^{1}/_{2}$" in diameter and no more than 4" long. Remember that a sprocket has to be accommodated on each axle. The cost and the weight of the machine would now be huge and that would take it well outside the ability of many builders to handle it.

So I have discarded simulated full inertia, but I suggest using solid rollers as a part-solution rather than fabricated ones. Builders can decide for themselves.

A drawbar-pull sensor as used on the Shellshear model is not (yet) included on my machine but is perfectly feasible and requires no modification to the basic design. It seems to be an elegantly simple solution to the problem.

Materials

Stock sizes of materials have been chosen to minimise the amount of metal cutting, but it doesn't always work out. Generally, finished sizes are given, so allowance may need to be made for cuts and finishing. Many of the smaller pieces will be available in your scrap box. The materials for a table for the UTS are not included.

STEEL:

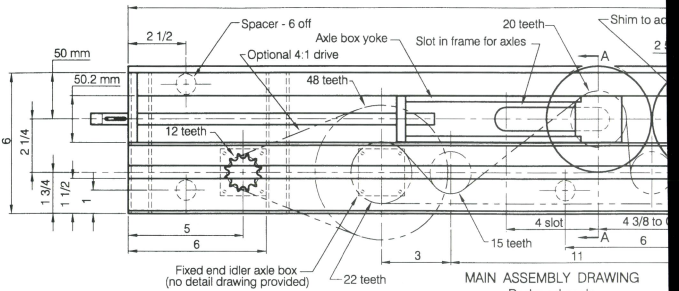
- Two pieces of 3mm plate 50x6 inches for frame side plates. It's best to get these supplied and guillotined accurately to size without distortion, that means by shops equipped with big precision guillotines. That was done while I waited and my cost was $14. Remember that the sides and ends of the plate become reference points during the construction so have it cut accurately.
- 124" of 1"x1"x0.1" (25 x 25 x 2.5mm) square hollow section (for axlebox guide frames and for the four vertical stanchion guides). You should test your tubes for the fit with the 20x20mm tube. My tubes were a perfect fit after a bit of linishing. 2mm wall thickness yields a rather sloppy fit and is too thin for good thread holding. While you could use 3mm or thicker-walled tube, and it would give extra metal for tapping, it cannot give a sliding fit for the stanchion posts. So 2.5mm thickness is really the only suitable size.
- 100" of 25 x 25 x 3mm angle (bottom members of axlebox guide frames.)
- 100" of 38 x 38x 3mm angle (1.5 x 1.5 x $^{1}/_{8}$") (base angles or "feet" of the machine).
- 8" 50x50mm (2 x 2) square solid bar (plus allowance for cutting! For axleboxes).
- 2m of 25 x 4, 5 or 6mm flat (the 4 axlebox "yokes" and other places)
- 0.5m of 25 x 10 flat (ends of axlebox guide frames)
- 1m of $^{5}/_{8}$" BMS round (main axles). Use $^{3}/_{4}$ or $^{7}/_{8}$" if adding heavy flywheels but check that the bearings used can still fit into the axleboxes and see comments in the "Conclusion".
- 2m of $^{3}/_{8}$" W screwed rod (tie rods between side plates; $4 per metre)
- 4ft of old $^{1}/_{2}$" water pipe (for the 7 stretchers between side plates). This pipe is approximately $^{7}/_{8}$" OD and $^{9}/_{16}$" ID.
- 1m of fine pitch $^{1}/_{2}$" diameter screwed rod such as NF or BSF or metric 1mm pitch. Unfortunately NF is only available in high tensile and at great cost ($40). Whitworth can be substituted but note the comment about minimum adjustment resolution. I later found some 12mm x 1.5mm pitch rod, but still costing $23 per metre. (Required for w/b adjusting screws but optionally can be cut in the lathe).
- 6m length of 50 x 5mm flat for rail inserts — approx $20.
- 30" x 5" of 4mm or 5mm or 6mm plate (for roller hubs if fabricating the rollers).
- 8" of nominal 4" galv. pipe (approx 4.5" OD x $^{3}/_{16}$" wall for roller rims, only needed for fabricated rollers)
- 12 inches of 1" or 25mm BMS round (stub arbors)
- 12 inches of $^{3}/_{4}$" or 20mm BMS round (misc collars, spacers etc)
- 12 inches of $^{7}/_{8}$" or 22mm BMS round (misc collars, spacers etc)
- 10 inches of 1.125, or 1.25" BMS round (roller hubs, required whether fabricated or not, and also for hub of handle).
- 4 inches of 3" (75mm) or 2$^{3}/_{4}$" diameter BMS round (4th axle rollers, if you are making them).
- 12" of $^{1}/_{2}$" BMS for 4:1 counter-shaft.
- 2ft (1m) of 20x20x2mm square tube. (For stanchions: After linishing this is an excellent fit in the nominal 25mm square vertical stanchion guide sockets. These four posts form the basis of the end stops that fix the loco horizontally — about $3 per metre.)
- Two pieces of 1.6mm steel cut and folded commercially, 50" long with a right angle bend $^{5}/_{8}$" from one edge. See drawing as they are not the same. (Covers for the axlebox channels. They also act as the axlebox "keeps". My cost $10).

MISC:

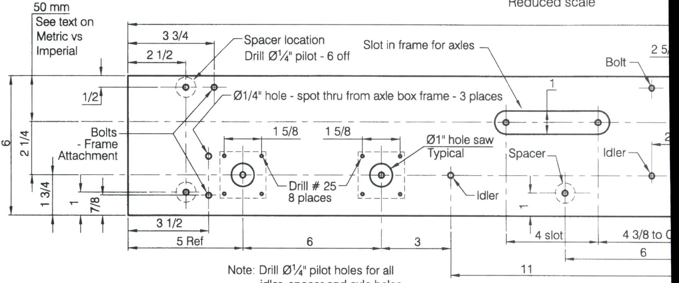
- Two 12" stainless steel rules for scales; (mainland Chinese origin, $3 each).
- 5 litres of concentrated Hydrochloric Acid, to be diluted about 1:10 for use for descaling. ($12.85)
- Spray cans of paint of chosen colour(s); (discount store=$2 each).
- 250ml "Ferropro" ® anti-rust coating $3.50.

FASTENERS:

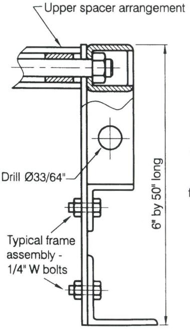
- 10 x $^{1}/_{4}$" x $^{1}/_{2}$" W hex bolts and nuts.
- 20 x $^{3}/_{8}$" W hex nuts (the small non-standard heads are an advantage).
- 50 x $^{3}/_{16}$" x $^{1}/_{2}$" W hex bolts or similar size in metric or US.
- 10 x $^{3}/_{16}$" W each C/S & R/H nickel



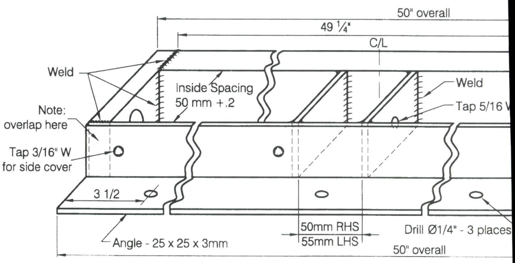
MAIN ASSEMBLY DRAWING
Reduced scale



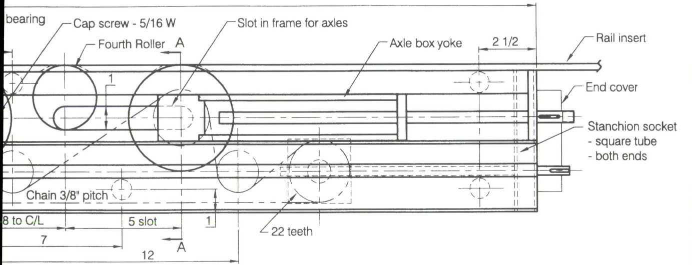
FRAME PLATES - drill back to back
Material: 3 mm or 1/8" steel plate

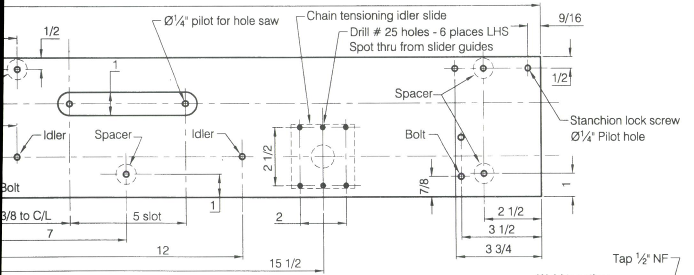


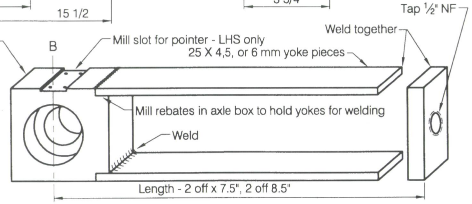
END VIEW OF SIDE FRAME RHS



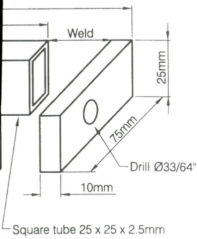
AXLE BOX GUIDE FRAME - 2 off
Note: Difference between RHS & LHS
in central Axle Box compartment

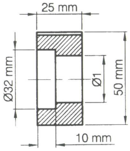




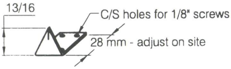

Tap ½" NF
Weld together
50 mm square bar
Mill slot for pointer - LHS only
B
25 X 4,5, or 6 mm yoke pieces
Mill rebates in axle box to hold yokes for welding
Weld
Length - 2 off x 7.5", 2 off 8.5"
B

AXLE BOX YOKE ASSEMBLY
4 Off - see length note





SECTION B-B
THROUGH AXLE BOX C/L



POINTER
2 Off - 1.6 mm steel or brass
See section A-A for ruler details

Not to scale

UNIVERSAL TEST AND DEMO STAND FOR LOCOMOTIVES - Sheet 1

plated machine screws.

- 10 x 1/4 x 1/4" W grub screws (or metric equivalent), or setscrews, for setting up, OR as an alternative —
- 10 x 3/16 roll pins 1" long (optional fixing)
- 18" of 1/8" square keysteel.

BEARINGS:

- 6 off 6201 bearings sealed both sides (32 x 12 x 10mm); (10 if making a pair of fourth axle rollers). Use heavier bearings if adding a heavy flywheel. The 50 x 50mm axleboxes will accommodate up to 1.7" (42 or 43mm) OD bearings; (my cost $3.90 ea in 10 quantities)
- 10 off 6000 bearings sealed both sides (26 x 10 x 8) ($3.80 ea in 10 quantities) for sprocket idlers.
- 4 off 5/8 x 1 9/16" Imperial bearings (RLS 5) (my cost $12 ea.) for input/output shaft and for middle shaft RHS.
- 2 off RLS4 bearings for 1/2" diameter input counter-shaft if making the 4:1 reduction stage.

SPROCKETS AND CHAIN:

Note that there are two chain systems - US and British. Either is OK but ensure that chain and sprockets are of the same origin.

- 3 x 20T x 3/8" pitch (O6B20) (roller axle sprockets)
- 4 x 15T x 3/8" pitch (O6B15) (idlers)
- 2 x 22T x 3/8" pitch (O6B22) ("end" sprockets in drive train)
- 1 x 48T x 3/8" pitch (O6B48) (for 4:1 speed reduction)
- 1 x 12T x 3/8" pitch (06B12) (for 4:1 speed reduction)
- 3m of 3/8" pitch chain and two joiners.
- 4 x 23T x 1/4" pitch sprockets (to link w/b drive shafts together, $12 each. Much more expensive than 3/8" pitch. Can be 20 to 25T but note comment about minimum w/b resolution.
- 2 x 15T x 1/4" pitch sprockets for chain tensioning.

(The 1/4" pitch components are only made in US sizes. I did not investigate metric chain.)

- 4 ft approx of 1/4" pitch chain and two joiners ($40 for 10ft roll since the supplier would not cut the roll. The specified design requires just under 2ft of chain at each end, so if anyone wants to buy some off the roll at $4 per ft plus $3 for postage, contact me). Incidentally, there is no half link joiner as in the larger pitches, but there is a two link narrow/wide joiner instead of the single narrow/wide of 3/8" pitch. Normal joiners are wide/wide. An odd pitch join with 1/4" pitch always involves at least two pitch lengths and two plain joiners.

When using an idler, tension adjustment is built in so there is no need for half link joiners. But two normal joiners will be required anyway.

In DEMO mode, the final drive from motor to test stand will be relatively slow speed and moderately high torque so it should be by toothed belt ("timing" belt). Toothed pulleys are very expensive in Australia so users will probably make their own. For information on toothed belt drives see Appendix 2.

COST: Excluding drive systems and a table the three big cost items are bearings, sprockets, and steel. I estimate the cost at less than A$500 (A$1 = approx. 63 US cents or 40p at time of writing). There is going to be a tremendous range of cost in an electric drive. You could spend $20 for a wiper motor at an auto wrecker or $1000 for a sophisticated 3 phase motor and variable frequency controller.

Equipment required

LATHE: A 4.5" lathe can just handle the rollers, but the heavier weight and power of a 6" lathe will cope more easily.

MILLING MACHINE: A mill/drill is required for cutting the 1/8" keyways and milling out the two slots in the two frame side plates, also for the slots in the 4th axle assemblies. The two ends of the slot and as much metal as possible in between, should be removed with the hole saw first, since sawing is quicker than milling. Hand cutting is possible but is slow and hard work.

BROACHES: 1/8" x 1/8" keyway broach with guides and packing strips for 5/8, 1/2 and 3/8" bores. 3/8" bores require a broach with a 1/8" back. If this is not available use grub screws engaging in dimples in the shaft to lock the chain adjusting screw handwheel. See detail drawing.

No 3 PRESS: for broaching and for pushing wheels and sprockets on and off axles.

ARC WELDER: 2.5mm rods will do all jobs.

PROPANE TORCH with or without oxygen, and 245 grade solder and flux for silver soldering smaller parts. It's neater than welding for small parts.

BAND SAW: saves a lot of hack-sawing.

A **12" ABRASIVE CUTOFF** and/or mitre saw: saves time and elbow grease, especially on the bevelled rail inserts. A 14" model is best but expensive. 10" is also OK but the blades have a short life. 12" is the happy medium. Note that the abrasive disc mitre saw can only swing to an angle of 45 degrees. Now we would prefer 30 degrees for the bevel cut on the ends of the rail inserts. So I hand finished the angle on some of the ends from 45 degrees to 30 degrees with the angle grinder.

ANGLE GRINDER: extremely useful for cleaning up welds and cutting away mistakes! I would even go so far as saying it is essential! A medium sized machine is best, with about 125mm (5") diameter wheels and 600 to 800 watts. The big ones are too heavy for one-handed operation and the small ones do not have the "grunt".

HYDROCHLORIC ACID DE-SCALING BATH: The tank needs to be at least 26" long to accommodate the long pieces (turn them end for end to do the full length). 30" of 6" diameter PVC plastic drainpipe with a cap glued on the bottom will just hold the 6" wide frame plates. It won't hold the plates if they are widened to 6 1/2". The angle iron "feet" do not need to be descaled, only precision parts.

Hydrochloric acid descaling has been described in previous articles in *AME* by Peter Lukey and the writer, but briefly, (1) DON'T use the HCl for ANY work on copper, and (2) take meticulous precautions against splashing.

LINISHER (or belt sander to overseas readers): Coarse and medium grit metal cutting belts will be found very useful.

DRILLS: 3/16" and 1/8" long series, may be needed for drilling the holes in the hubs of wheels if they are to be pinned; No 25 (for tapping 3/16" W); 1/4", 5/16"; 11.5mm or 29/64th for tapping 1/2" NF; centre drill.

REAMERS: 5/8", 1/2" and 3/8", or if using metric components use the appropriate metric reamers.

TAPS: 1/2" NF tap (if using NF threaded rod for w/b adjusting screws. You can avoid the need for tapping by welding a ready-made nut to the part requiring the tapping, but first put a clearance hole under it. Also make sure it is exactly lined up.

Also — 3/8" W, 1/4" W, 3/16" W taps.

Small two-leg PULLER: for sprockets.

TUBULAR SPANNERS: 3/8" W, 1/2 and 3/8" NF, for the recessed tie rod nuts etc.

HOLE PUNCH, screw type (optional): 1" for sheet metal (for covers for the small chain assemblies at ends of test stand), otherwise use a hole saw. The punch gives the cleanest hole.

HSS HOLE SAWS: 5/8", 3/4, 7/8, 1", 3" on interchangeable arbors are very useful. The smaller sizes should be within the capability of the average drill press to drive. 3" is used for making the discs for the 4th axle assemblies but they can be cut out on the bandsaw otherwise. Always use lowest speed available. Cutting out the discs to make the main rollers is difficult whatever method is used. A 4.5" diameter hole saw is expensive ($75-85), not readily available in my location, and cannot be driven by small drill presses. That leaves the only practical alternatives as either oxy-cut circles from plate, or hacking them out on the bandsaw. The latter method is very time consuming but is how I did mine since I don't have oxy. If doing it again I would get the six discs cut commercially from solid 20mm plate.

To be continued ...

Have you built something for the workshop lately?
If you would like to share the idea with others but not sure about writing it, please contact the Editor. He will advise you and maybe able to arrange some assistance.

Helmholtz Valve Gear

by Geoff Murdoch

Having always been intrigued why Marklin electric models of German locomotives came "complete with Heusinger valve gear," which looked identical to Walschaert's valve gear, a very concerted effort was made to unlock the mystery. The resultant research uncovered Helmholtz valve gear which is also referred to as Heusinger gear. But the question still remained "Why?"

Briefly during 1843 and 1849 it appears that a handful of young designers in Belgium, France, Germany and Prussia were all concentrating on inventing locomotive valve gears and quite co-incidentally developing toward an almost identical conclusion.

Although Walschaert's is now the most universally accepted and recognised, it is uncanny how Angele's valve gear of 1843 so closely resembled today's Walschaert's (See **Figure 1**) The difference being that Angele did not include the combination lever and while it operated from a return crank, the original Walschaert's design (See **Figure 2**) operated from an eccentric.

Then in 1849 Edmund Heusinger, originally from Prussia, invented a valve gear similar to Walschaert's. It operated from a return crank and incorporated a combination lever operated from a sliding block in the bottom of the cross head; i.e. no swing link. The main difference being that a very long eccentric rod connected to the bottom of the curved expansion link was pivoted between the cross head and the cylinder (See **Figure 3**). This resulted in the curved expansion link facing in the opposite direction to that of Walschaert's, with the radius rod going backwards to the combination lever.

It was generally accepted in Germany that Heusinger, later known as Heusinger von Waldegg, was the first to design this type of valve gear. In 1875 Waldegg conceded that Walschaert was indeed the first, but by then the name Heusinger was firmly entrenched into the German Railway history.

Another designer, Richard Von Helmholtz (1854-1934) was of the opinion that Walschaert's valve gear could be changed or amended, but not necessarily improved. From 1884 to 1917, Helmholtz was chief designer at Krauss Locomotive Works, in Munich, during which time he was credited with two major designs.

First in 1883, he designed what was to be later known as the Krauss-Helmholtz truck (bogie) for locomotives. Surprisingly, it was not patented until 1887 and not put into use until 1888. In practice, the truck physically coupled either one leading or one trailing driving axle to its nearest free run-

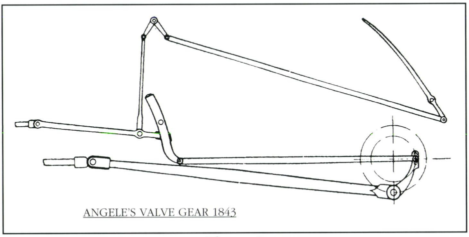

ANGELE'S VALVE GEAR 1843

Figure 1

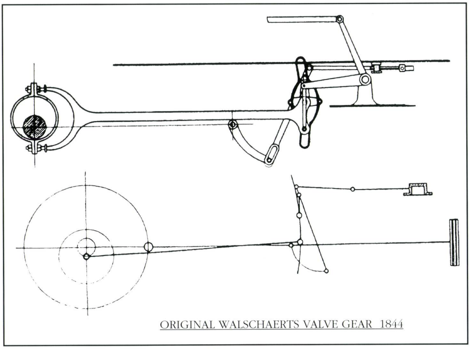

ORIGINAL WALSCHAERTS VALVE GEAR 1844

Figure 2

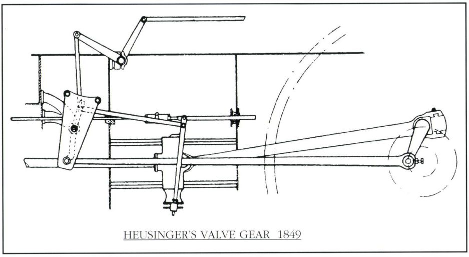

HEUSINGER'S VALVE GEAR 1849

Figure 3

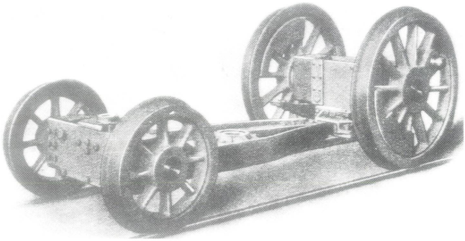


Figure 4 (From *Articulated Locomotives*, Lionel Weiner, p.299)

ning, or non coupled axle and was pivoted, sometimes on a lateral sliding arrangement, near the centre of the truck to provide a more flexible wheel base for either smooth running through sharp curves, or for more stable running at speed (See **Figure 4**).

Secondly, in 1884, Helmholtz designed his version of Walschaert's locomotive valve gear in which the curved expansion link, normally associated with Walschaert's, was replaced with a straight expansion link. The lack of a curved expansion link was compensated for by re-arranging the positions of the expansion link pivot, sliding block and lifting levers (See **Figure 5** & **Photo 2**)

Noticeable features of Helmholtz's gear show that (a) Because the straight link pivot point is situated higher than Walschaert's curved link, it appears to have a very long tail. (b) The pitch circle diameter is small (c) The valve travel is short and (d) The valve chest is on an acute angle. The main reasons for this are to provide plenty of room for extra long ports for adequate steam flow due to the very small port widths and to allow easy access for maintenance, particularly in remote areas.

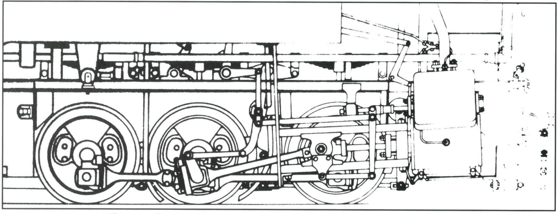


Figure 5 Helmholtz valve gear as fitted to 750mm gauge 0-6-2T — also with rear Helmholtz truck. Hence brakes on the first two coupled axles only.

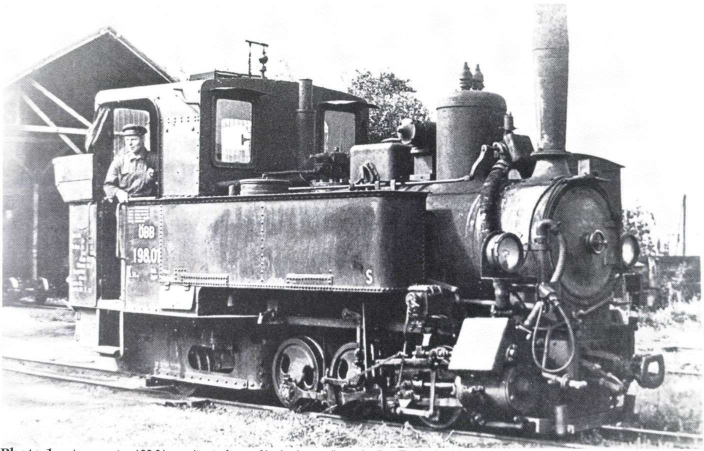
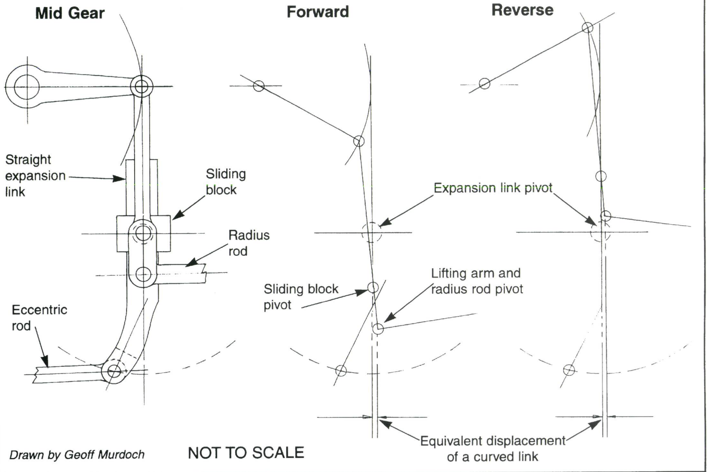
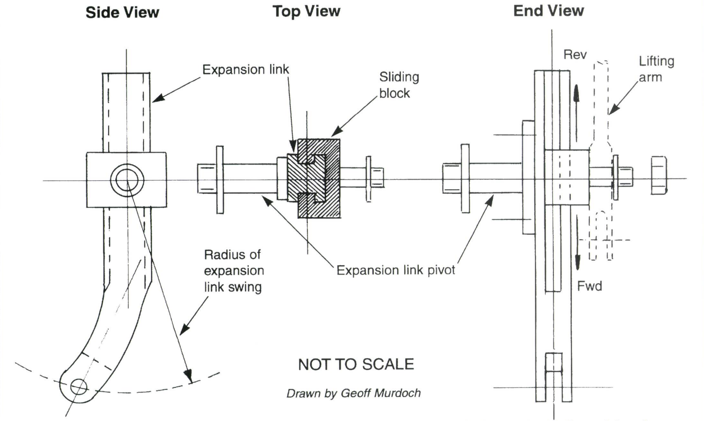


Photo 1 — Locomotive 198.01 standing in front of boiler house (loco shed) in Treibach 1956. Note the large steam chest on an acute angle.
(Reproduced courtesy Rene Geirsch from a photo by G Gilnreiner and an article by G Mayr)

HELMHOLTZ VALVE GEAR





One method for constructing the expansion link and sliding block

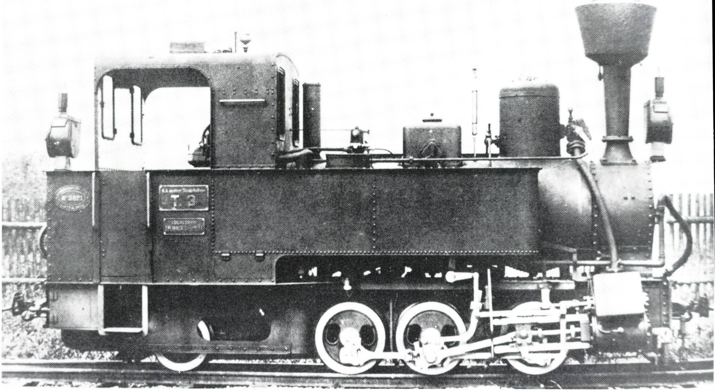


Photo 2 — Locomotive T3 before delivery *(Reproduced courtesy Krauss & Co. and an article by H Griebl)*

The diagrams in **Figure 6** demonstrate how Helmholtz's valve gear operates while that in **Figure 7** shows one method of locating the sliding block on the expansion link.

In closing, Helmholtz's valve gear may be of advantage to the steam locomotive modeller thus avoiding the necessity of having to mill or cut out and file a curved link.

References:

The Evolution of Locomotive Valve Gears — A paper read before the Institution of Locomotive Engineers, by T.H. Shields, 23rd September, 1943, London; courtesy National Railway Museum, York, UK.

Walschaert's Valve Gear — *Henry Greenly, Revised Edition by Ernest A. Steel, 1948*

Manual of Model Steam Locomotive Construction — *Martin Evans, Fifth Impression 1974*

Articulated Locomotives — *Lionel Wiener, reprinted by Kalmbach Publishing, 1970, P.298 and P.507*

Guiness Book of Rail Facts and Feats *1971, P.63*

Acknowledgements:

Lloyd Dannenberg — *For renewing my curiousity as expressed in the opening sentence.*

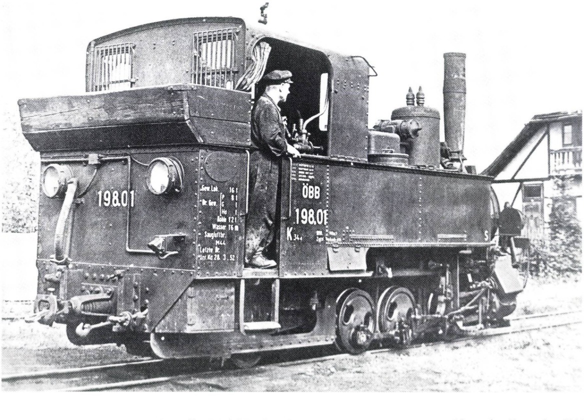
Rene Giersch — *Germany, Photos and Drawings*

Philip Atkins — *National Railway Museum, York, UK, Relevant historical information*

Photo 3 — *(right)*

This is a rear view of locomotive 198.01 standing in front of the engine shed in Treibach as in photo 1. This view shows some detail on the expansion link and really shows off the extreme slope of the steam chest to better advantage. It also shows plenty of other interesting detail on the locomotive.

(Reproduced courtesy Rene Geirsch from a photograph by G Gilnreiner and an article by G Mayr)



Machine Light for the RF30 Mill Drill

by Ron Griffiths

Drawing for publication by Dave Adams

Operating a milling machine without a proper machine light is one of those things we tend to put up with - for a while. But after enough difficult situations where a lead-light is used as a substitute, the hankering for the real thing becomes greater and greater.

Having noticed a range of 12 volt Halogen desk lamps in supermarkets and lighting stores, the possibility of adapting one for a machine light was stored in the memory bank. After a few more of the afore-mentioned difficult situations, a serious visit to the local lighting shop was in order, and with the help of a somewhat bewildered assistant, a choice was made from the large range of styles and shapes.

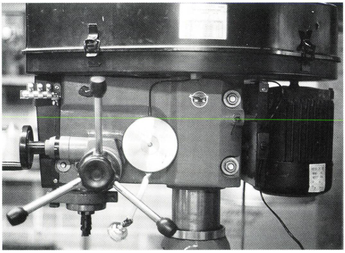
Model No. DJ1 by Telebix Pty., Ltd. Was chosen because:

1. The base, which looks like a CD was compact and contained all electrical connections.
2. It had a separate plug-in type 12v transformer with on/off switch in the cord.
3. It only cost $39.00

Having bought the light the next thing to do is to get a 250mm length of 3 core electrical cable, sold as 2.5 STE. This indicates 2.5mm dia Solid x Two plus Earth wire. I found this cable to be soft enough to be bent into any likely position, while being firm enough to hold the desired position.

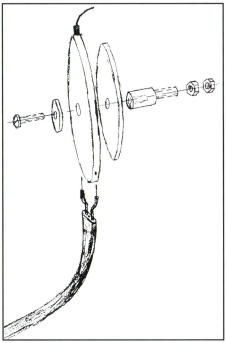
Having bought the light and the cable, the next move is to make a Mounting Pedestal, a Backing plate and a large washer as shown in the sketch. The cable, which takes the place of the wire arms supplied, also has to be prepared as shown.

Fitting the light to the RF30

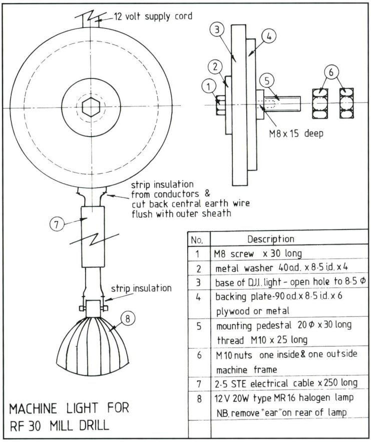


Drill a 10mm dia clearance hole through the side frame of the RF30, 102mm from the centre of the Quill handle and 95mm up from the underside of the side frame. The accompanying photograph shows the finished light mounted on my own RF30.

NOTE! Before drilling this hole, put a piece of rag up inside the cavity of the frame to prevent any swarf getting in the rack and pinion Quill drive. Remove rag carefully after drilling, and check to see that no swarf remains. While you are poking around in there why not get the oil can out and surprise the rack and pinion? Bet you've never oiled it before!



Assembly sketch *drawn by the author*


12 volt supply cord
①
②
③
④
⑤
⑥
M8 x 15 deep
strip insulation from conductors & cut back central earth wire flush with outer sheath
⑦
strip insulation
⑧
MACHINE LIGHT FOR RF 30 MILL DRILL

No.	Description
1	M8 screw x 30 long
2	metal washer 40o.d. x 8·5 i.d. x 4
3	base of DJ1. light - open hole to 8·5 Φ
4	backing plate-90 o.d. x 8·5 i.d. x 6 plywood or metal
5	mounting pedestal 20 Φ x 30 long thread M10 x 25 long
6	M 10 nuts one inside & one outside machine frame
7	2·5 STE electrical cable x 250 long
8	12 V 20W type MR 16 halogen lamp NB. remove "ear" on rear of lamp

Mount the light on the machine using the "exploded" sketch as a guide. If you wish it could be mounted on the left side of the machine, however, the right side is traditional and more convenient I find.

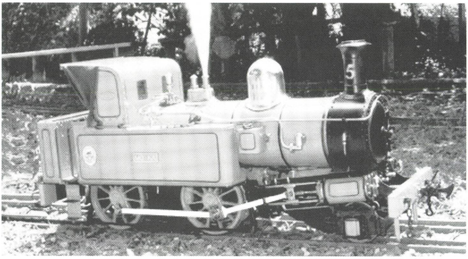
Finish off by sticking the on/off switch onto the motor frame with silicon, and pop rivet a small bracket/clip onto the motor frame on the side near the top to locate the 12v cord as shown in the photo.

For those interested in fitting this light to some other machine, the dimensions of the base are 126 dia x 12 thick, and the 12v supply cord plugs into it at a choice of two positions which are spaced 180° to each other.

WARNING: Although the voltages in this project are very low (only 12v DC) AME advises **caution** when working with electricity

Isle of Man Steam Locomotive *Mona*

By Jim Woods



The Isle of Man (IOM) is a small island about 30 miles long by about 15 miles wide in the middle of the Irish Sea. In 1872 they started to build a 3 foot railway system which spread out from the capital, Douglas, firstly to Peel on the west coast, then to Port Erin via Castle Town in the south and north from St Johns to Ramsey. Today only the south line remains but 13 of the 15 Beyer Peacock 2-4-OT steam locos still exist there. At present numbers 1, 10, 11, 12 are in service along with number 15 *Caledonia* the only 0-6-0 by Dubs.

I was lucky enough to live on the IOM for a year at Colby near Port Erin and my house looked over the railway. Whilst I originally went there for the TT motorcycle races (and ran out of money) I became very interested in the IOM railways.

Here I also meet Mike Casey, the designer of the 5 inch. gauge model *Peveril* (this being number 6 in the fleet). Mike's model won the silver award at the London ME Exhibition. When I left the IOM to come home to New Zealand, Mike gave me a set of his drawings.

So in 1993 I started on my version of the IOM engine and picked to model number 5 as she had the highest mileage at 1.6 million miles in her working life and still exists in one piece at the back of the Douglas engine shed. I intended to keep as close as possible to the fill size loco. She has $6^1/_8$" drivers with 4140 aisi steel tyres shrunk on, phosphor bronze axle box crowns pressed in with wick feeds and wool oil pads in the axle box wells and split big end brass with adjusting wedges. The boiler is of copper at $5^3/_8$" dia. with a firebox some 5 inches long with 4 superheaters of 1 inch dia. and sixteen $^7/_{16}$" fire tubes and a short stainless arch. The boiler has a ticket for 100 psi, but number 5 potters along at 80 just fine. The cylinders are 38mm bore to suit rings out of a small chain saw motor, and a 3 inch stroke. The slide valve is of aluminium bronze with a stainless buckle. The valve gear is Alan link motion. She is also fitted with working steam brakes and all the valves and the whistle work like the big ones. Tanks and cab are of brass and held together with 3,500 $^5/_{64}$" rivets (the next loco will have welded tanks!) and she is painted in as close a match as I could make up of Madder Brown. She weighs in at 160 pounds.

I finished nailing her together 4 days before we set off for the U.K. in June 2000, to attend the International Model Locomotive Efficiency Competion (IMLEC) at the Leyland Society in Lancastershire. We went over to the IOM and spent some time running on their 1 mile ground level track with Number 6 *Peveril* and had photo's taken alongside her big sisters.

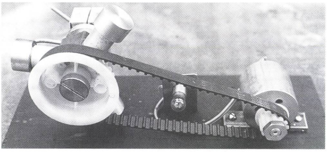
At IMLEC we had a good run hauling 8 adults (and 8 cans of Guiness) being placed 6th out of 26 starters with the finial efficiency return of just over 1%!

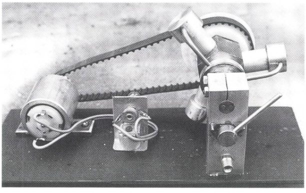
Now many of you will be asking why her name plate has MO NA with the gap. When the big one (and number 4, LO CH) where built in 1875, the overflow pipe from the injectors ran down the outside of the tank, right where the name plate is. But instead of moving the plate one way or the other, they put a space in the name where the pipe went. I am yet to finish the loco traversing jack to go on the right hand tank and lamps and brackets for the buffer beams.

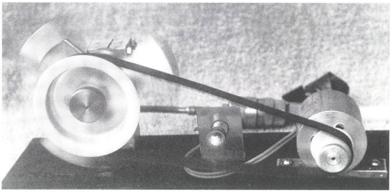
Small Rotary Engine Drives a Generator

Remember John Symon's small rotary engine in issue 102? Neil Matherson of WDLS in Sydney has not only made the engine but has put it to work, hooked up to a small generator as seen in these photos. The generator is from Jaycar, motor YM2709 (cost $4.95) and the belt drive is from an old photocopier. In the 3rd photo it is running on about 30 psi of air and lighting a 6v globe. The motor ran well on 10 psi before the generator was added.

(3rd photo by Neil Matherson, others by David Proctor)







Kearney Springs Historical Park Miniature Railway

by Gretchen Thomson

On the 3rd sunday of every month 26 volunteer members of Toowoomba Live Steamers Inc. meet at the park to run train rides. The club enthusiasts come from all over south east Queensland to share their passion for steam, diesel and electric model engines.

Formed in 1973, the club has been operating out of Kearney Springs Historical Park since 1998, following the closure of Toowoomba Willow Springs Adventure Park. With help from the Toowoomba City Council, volunteers developed the new site to accommodate 656 metres of track, fixtures and buildings.

The track meanders its way through lovely picnic areas beside streams of spring-fed water. The members have, over the years, planted many different kinds of native trees and shrubs to encourage a wide range of birds.

The railway tracks consist of a 5" and $7^1/_4$" dual gauge circuit, weaving in and out of hilly parklands with passing loops at the station, maintenance area, steaming bays and turntable. At the southern end of the railway, near the steaming compound, can be seen two sets of conventional operating points, whilst at each end of the station are two sets of hydraulically driven remote controlled points. Drivers enjoy the hilly terrain of the track as the steam locos work hard to pull their loads up the 1 in 80 grade.

Part of the lovely bushland setting in Toowoomba's Kearney Springs Historical Park

Locals as well as visiting families often make use of the picnic areas with their wide footpaths for wheel chair access and barbeque facilities.

Open days are held on the third Sunday of every month from 10:00 am at Kearney Springs Historical Park, Spring Street, Toowoomba Qld. Admission to the park is free. Rides on the miniature train are by gold coin donation. Visitors are always welcome to come and have a chat. I found my visit to Kearney Springs Miniature Railway very informative. The members were very happy to chat and share their knowledge with me, a train buff beginner.

For further information regarding memberships to the Toowoomba Live Steamers and the Kearney Springs Miniature Railway please contact the club by writing to the Secretary, Toowoomba Live Steamers Inc, PO Box 916, Toowoomba, Qld 4356 or phone John Thomson (07) 4636 4671 (or ask someone on open days at the track). Prospective members and visitors are most welcome to attend the monthly meetings in City Hall, Ruthven Street at 7:30 pm on the 4th Thursday of each month.

Hunslet locomotive driven by Graham

An old fence is as good a place as any for a budding train spotter

P S *Eureka*

as emailed to Dave Harper by Paul Pavlinovich

Recently in AME there was an article about the engine in the Steam Paddle Ship *Eureka* based out of San Francisco (*Issue 99*). Well, as it happens I'm based out of San Francisco too (at least for now, I'll come home one day) so I waited for the next sunny day (ok, so it took a couple of months) and went down to the San Francisco Maritime Museum and took some pictures of the *Eureka*. They are attached, if you would like to use any of them you are welcome to do so.

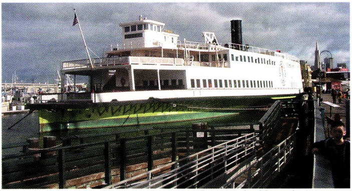
Most of the images came out pretty well — I apologise for those that did not, as you can imagine there are no "good" photograhpic angles for something three stories high inside a large metal sided room with viewing ports cut in here and there.

While the boat itself is in pretty sad shape around the hull she is water tight and with some restoration work (being carried out) and new paddle wheels she'll probably steam again some day. I do not know what condition the boilers are in, but the engine looks like it could be steamed. They keep everything in pretty good shape considering her age.

The ship is in the care of the National Parks Service and is part of the San Francisco Maritime Park.

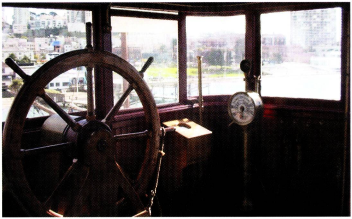
(Paul is back in Australia now. I was not able to use all the images he sent, but these are a good sample ... Ed.)

Cylinder top

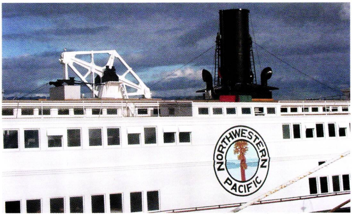


Rear side of the vessel. Note: she is a 'double-ender'

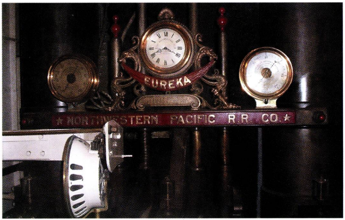
Engine telegraph



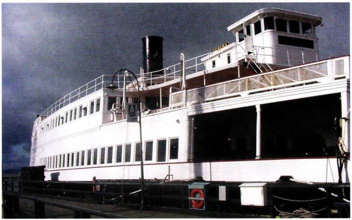
The forward wheel house



The beam of the huge walking beam engine can clearly be seen



Various indicators



Forward side view of the Eureka

Bracken Ridge Central Sixth Birthday Run

by Dave Harper

Photographs by Peter Hall and Paul Blank

The 23rd of June 2002 saw the Sixth Birthday Run at the Bracken Ridge Central track on the north side of Brisbane. I contrived to be away flying model planes on that day, but Peter Hall was there and kindly took some great photographs of the proceedings. When I got together with Neil Mackenzie to put names to the photos, Neil showed me some impressive enlargements from digital photos of a couple of the locos at the meeting. Hopefully these prints will be useable by our trusty editor to complement this report!

As usual an officer from Queensland Railways was invited to present the prizes on the day. This year Mr Paul Slater, Manager, Heritage Fleet, Ipswich Railway Workshops did the honours.

Photo 1 shows Mr Slater presenting the prize for the Best Presented Loco to Derek Wilson of Bribie MELSA for his 38 Class loco.

The great shot of the blue QGR A10 is another shot from Paul Blank. This model belongs to Des Pedley of Maryborough MELSA, **photo 2**.

The BB18$^1/_4$ in **photo 3** was turned out by my old mate Ken Saunders in record time, but as still good enough to win Best QR Loco on the day!

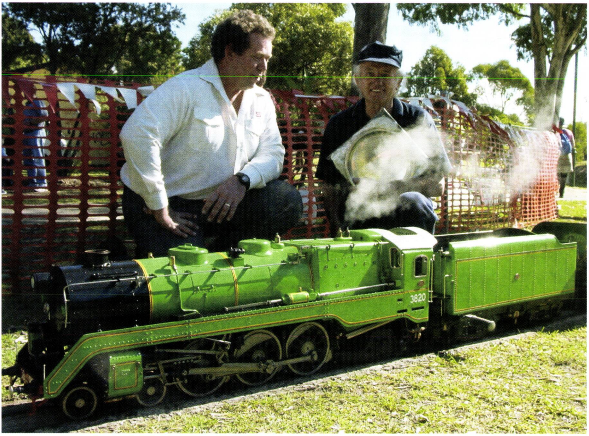


Photo 1

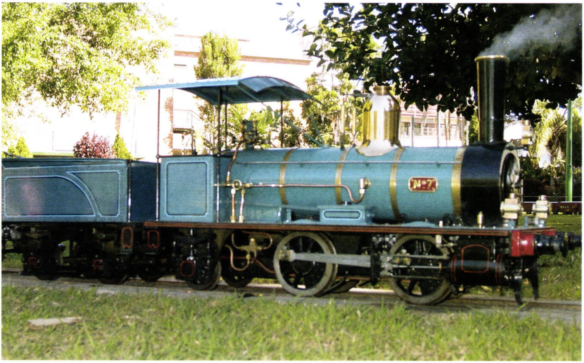


Photo 2

Photo 4 shows George Bishop's colourful *Marie E*, another visitor from Maryborough.

The loco that never was — the CC17 was designed but never built, at least not in full size! However, David Jones owns this fine $^{1}/_{8}$ scale model, in **photo 5**; David's son Paul is checking things out while Ray Chapman prepares his AC16 in the background.

Photo 6 is of Merv Feeney's bright yellow Switcher, and **photo 7** shows the first outing for the Stirling Single of David Dettmar, a recent recruit to the model loco scene, who apparently bought this model from Bob Kimber of Maryborough. Te boiler was tested on the day and okayed, and David had his first go at driving it!

These are just a sample of the 19 locos that were present at Bracken Ridge Central for the 6th birthday run, which was a typical beautiful Queensland winter day, enjoyed by all who were there. I enjoyed my flying, too!

As already indicated, photos 1 and 2 were taken by Paul Blank. Photos 3 to 7 were shot by Peter Hall.

Photo 3

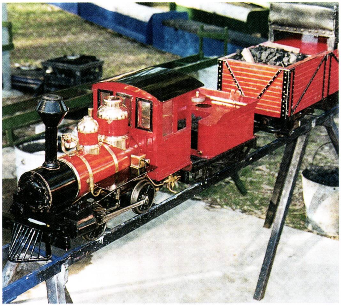


Photo 4

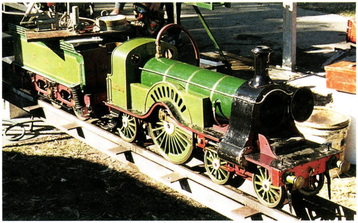


Photo 7

Photo 6

Photo 5 *(left)*

Sparks 'n' Arcs

Battery Electric Locomotives

By John Woodward

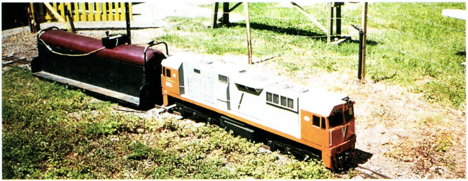
Drawings for publication from the author's originals by Dave Adams

Back in the early 1990s when I retired from work it seemed a good time to complete the happy home with what every home needs — a railway track. With the track laid a NSW C32 class steamer was built to run on it. What more could one want? A battery electric loco! At this time the NSW 422 class series of articles was running in *AME*.

I decided to build a VR S Class using one Lucas C39 generator for power, the triangular wave generator and power drive unit as published. I felt the loco circuit would send anyone off to the local Honda dealer, but I wanted battery power so devised a simple circuit that a non-electronic person could build with a little help from maybe a fellow club member.

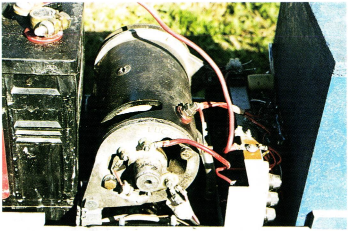
This circuit has one level of dynamic braking. The brake lead is a 220W car lamp, or can be a wire coil adjusted for the required braking effect. The relay coils show a diode to suppress back EMF; diodes marked 1 and 2 control which relays will work when running or braking. The capacitor and diode on the field relay will completely eliminate the spark that would occur when the relay opens.

The driver's train controller started off similar to that published but with a slight variation. Small kids can be let loose with

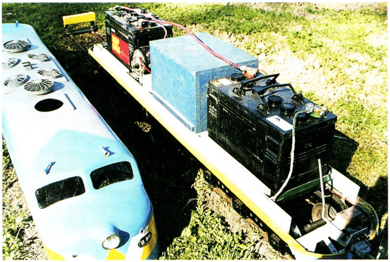


VR class N at Euroa. Note driver's controller sitting on the passenger wagon Photo: Ted Murrell

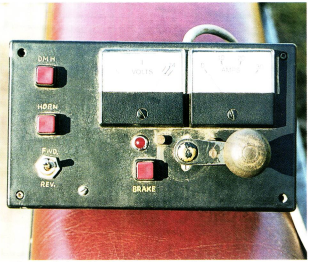
West Coast B86 Photo by the author



The motor and wiring in B86 Photo: David Proctor



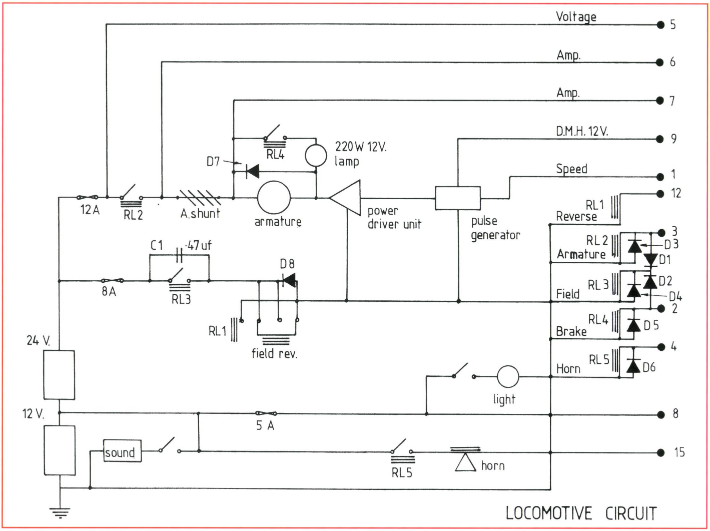
B86 with the cover off showing 2 deep cycle batteries. Photo: D Proctor



The simple hand-held driver's controller. Photo: D Proctor

Another B89, this time in V/Line livery. Photo by the author

The S class. Driving is child's play. Photo by the author



LOCOMOTIVE CIRCUIT

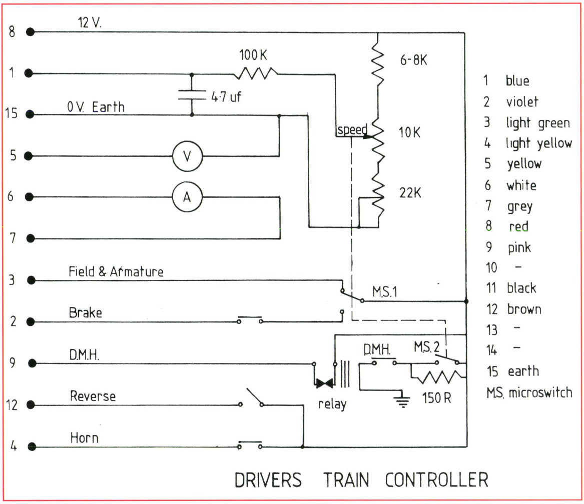
COMPONENT DETAILS

RL1-4	Dick Smith horn relays P 8035
RL1	consists of 2 of above, coils connected in parallel
RL5	in "2-horn" horn kit from Auto-Barn or K-Mart
D1-6	Dick Smith IN 4004 Z 3204
C1	0.47uf 630v Dick Smith R 2176
Lamp	220W 12v car headlamp, low and high beam linked
D7-8	IN 5408 Dick Smith no. Z 3228 ot BYV 96E (TV parts)

Left: The author's N class diesel electric N462 in V/Line livery, like his other locos, really looks the part. Photo by the author the train, which with one battery, speed is safe, but if the dead man's handle (DMH) is released the speed control must return to zero to reset the DMH. Likewise the speed control must return to zero for the brake to engage. To leave out the dynamic brake and the DMH interlock would simplify design further.

After building the S Class I built a VR N Class. I parted with the S Class, built a B Class for a friend, then decided I would have a B Class like the West Coast Railway runs between Melbourne to Warnanbool.

These locos have been running going on six years (for the S Class). They will pull one or two passenger trucks at Club runs and I have never had to pack up due to loss of battery power. The EDG batteries are coming up to six years old and will still do the day's run.



DRIVERS TRAIN CONTROLLER

Editor's note: Whilst I was in Euroa recently (see page 25) John Woodward kindly offered me a turn on his West Coast B86. It was a pleasure to drive. The controller is simple to operate, the loco performs smoothly and effortlessly and the braking is efficient. An added advantage is that the driver can sit in any position on the train and drive safely whilst keeping an eye on his passengers if he wishes. Being able to operate as multiple units is an added feature of these locos. The wiring circuits are simple enough to be understood by an electrical ignoramous like myself ... djp.

Right: Double heading B's and an easy load at Euroa. Photo by the author

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Mini Travelling Steady Rest

An improved simple travelling steady rest for small diameters and small lathes

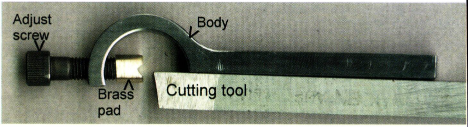
by Brian Smith

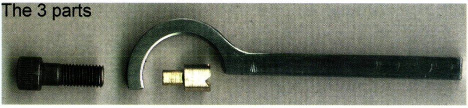
(In the last issue we published a short article on this topic from Brian Smith. Since that original article was written he has developed the idea further so we now present the expanded version for you ... Ed.)

The typical lathe travelling steady rest is usually far too big & bulky for the small diameters the lathe itself may be capable of turning.

The design of steady rest illustrated on the next page is one I built many years ago to overcome that problem with my employer's 6" lathe. There was no simple way of mounting a very small travelling steady so this tool sits on top of the turning tool. My original need was simply to overcome an immediate problem turning some $^{1}/_{8}$" diameter material. I had no thought of any further use after that job was finished & do not know what became of that tool. However some time after acquiring my present 9" lathe the same problem arose.

I intended to make the tool from a piece of $^{1}/_{4}$" flat MS but being, I think, out of gas to heat it, I opted for a welded construction. One of my tool posts has 8mm clearance above a standard $^{3}/_{8}$" tool bit so there





The apparent flats on the side of the round brass pad are reflected light

is ample clearance for the 6mm shank of the steady. The top face of a standard $^{3}/_{8}$" tool bit is dead on centre for my lathe with this tool post.

Before reading the first part then rushing off to make one the same please read the complete article.

Actual dimensions are noted for reference only being a mixture of Metric and Imperial because that is the way it happened. Any prospective builder of this tool has freedom of dimensional choice within the limitations of their own equipment.

My shank is a piece of 6mm x 9mm bright MS 60mm long arc welded to a scrap piece of $1^{1}/_{4}$" dia. x $^{3}/_{8}$" long MS bored to $^{7}/_{8}$" dia. The brass pad is fitted into a standard $^{1}/_{4}$" UNF hexagon socket cap screw drilled to take the pad. The screw gave me adjustment of the pad against the workpiece. The cap screw was selected being already knurled, not for the advantage of using a hexagon key. Adjustment is very necessarily by finger and thumb! One must be able to 'feel' when the pad is suitably adjusted against the workpiece. I had great ideas of the brass pad being interchangeable for different material sizes. Each pad would cover a small range of material diameters.

Nevertheless the pad has 2 different size vees cut into the front face at 90° to accommodate various diameters. It is a free fit into the adjusting screw to readily align on the unturned material but without any discernable play.

In use the steady can be set up along the lathe spindle axis (sideways) to suit the cutting tool used. There is no vertical adjustment as I try to keep my cutting edge level with the top of the tool bit shank. (see image at top of page). The cutting tool shown was randomly selected for illustrative purposes only.

Although not clearly shown the centreline of the 6mm adjusting screw is slightly above the tool cutting edge so that the 90° 'vee' is below the screw centreline. This helps to prevent the pad rotating during initial cutting if the workpiece tries to lift over the cutting edge. The vee can of course be cut or filed lower or to suit the height of one's favourite cutting tool!

Being at a 'loose end' one day, some time after scanning the steady rest for this article, the tool caught my eye. I started to look at it and dream of 'improvements'. Nearby lay a couple of nylon cheese head screws from my aeromodelling days (they held wings on). The same diameter and thread as the screw in the steady. Within not too many minutes the rest was sporting an additional tapped hole in 'the top' and two nylon screws. So into the lathe for a play or some 'tinkering' as our Editor would put it.

The screws were quite free in their holes moving about quite a bit although they looked as though they could work.

A lock nut soon fixed the sloppiness but my mind wandered back to the originals which did not have that problem. From the inevitable magpies nest of screws I found a $^{1}/_{4}$" UNF cheese head screw which was fairly free in the steady's thread. Adapted to take the brass pad I soon found that it would not support the workpiece properly. Wow! Twice I had been lucky to have a firm fitting screw! Again the locknut solved the problem. However manipulation of the pad against the workpiece was no longer a simple thumb and forefinger exercise. The locknut had to be tightened without altering the pad pressure on the workpiece.

My resultant design is shown at right. Two screws now with round brass pads, no vees and simple knurled locknuts. The locknuts need only light pressure sufficient to stop the screws wobbling around and are a very free fit for 'one finger' tightening. You can see how loose the top one is as, not being tightened, it is sitting at an angle to the screw centreline.

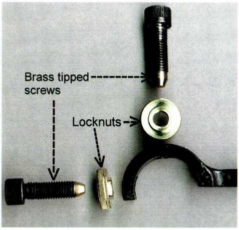
I have thought up various ways to avoid having to adjust the rear screw whenever the cutting tool is adjusted for the next cut. However each time I have concluded the work involved does not offset the inconvenience of feeding the pad back into contact with the unturned material. In my case the use of this tool has been rare and at most would be too infrequent to bother changing it.

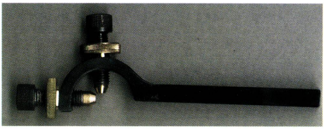
Rare as its use has been it is, like so many of our tools, nice to have 'for when I need it'.

A brief note on the brass pads.

In this later design they are a press fit or Loctited into the screws. As can be seen in the photos the ends are chamfered. The amount of chamfer necessary will be dependent upon how small a diameter is being turned. It is important that the material being turned cannot 'escape' between the two screws.

The tool does have limitations but they depend too much on the individual set up to attempt to list them — perhaps I haven't discovered them yet!





Handy Hint

Leaf springs can be made out of used steel and plastic strapping. Strapping is the flat strip material that is used to bind up large packaging. Steel strapping comes in a variety of shades (strength), thickness and widths. The black painted is not as springy as the gree painted stuff. it can be cut with a hacksaw and then filed to the required width. A bundle of 12 green painted strapping 0.7 mm x 16mm x 100mm long gives a good feel with a 20kg load. The desired springiness can be achieved by varying the number of steel and plastic leaves to produce the required height of the spring bundle.

— Alan Craggs

Tracks 'n' Trees

"Puff 'n' Stuff"

Getting started in small scale live steam

by David 'Doc' Wescombe-Down

Most of the following information relates to Gauge 1 and Gauge O as the title would indicate, but in a follow-up article dealing with sources, contacts and networks, there is also a mention of a HO live steam source in case anyone has an interest there. No originality is claimed for the content of this information, and it is only designed to present some introductory material to assist any *AME* reader wishing to explore the fascinating hobby of small scale live steam engineering and operation. If the article deals with such things at such a basic level, there are probably three reasons:

1. The scribe is neither an authority nor an expert
2. Perhaps you, the reader, may want to pass on a copy of the article for a potential newcomer to Model Engineering to read.
3. Part of an editorial balance is appealing to the widest range of readers to encourage them, as well as retain their support.

Why live steam?

That's an easy one — because they are real locomotives! They have heart, soul, identity and character, just like their 12 inch-to-the-foot predecessors. When working with small scale live steam, there is much more to the hobby than "playing trains" — it's not simply a case of switching on a power supply and turning a knob (although lots of us do that as well!). It's about life in the steaming bay with its aromas and sounds, lubricating with steam oil, wiping down, smoke palls from the stacks, occasional burnt flesh and the 'clunky' sound that this facet of model railroading/engineering brings. Just like the real thing.

In *Tracks 'n' Trees*, we are, for the moment, concentrating on the smaller gauges which normally do not have ride-on drivers. These gauges allow people to look at the realistic prospect of establishing a garden railway, perhaps combining several interests in the process, given that most Gauge 1 and Gauge 0 layouts might be too large for many indoor situations.

To benchmark where we are coming from, for Gauge 1, please read 10mm/foot , 1/32 scale running on 45mm ($1^{3}/_{4}$") gauge track. For Gauge 0, please read 7mm/foot, 1:43 scale running on 32mm ($1^{1}/_{4}$") gauge track (UK outlines) and one quarter inch/foot, 1:48 scale running on inch and a quarter track (USA outlines). A European 0 scale of 1:45 also exists, and it too runs on 32mm track.

It is generally accepted that with each gauge track come certain geometric constraints when installing — for example, the minimum radius of Gauge 1 curves is 1500mm (5 feet) with the recommended radius being more like 4.6 metres (15 feet) and in the case of Gauge 0, a minimum radius of 1200mm (4 feet) with a recommended radius nearer 1800mm (6 feet).

Having stated that, we can share that our 40 metre long (approximately) Gauge O garden railway has one loop with minimum radius curves of one metre, simply because that is how much room was available in the only site we had. The other loops comply with the recommended minimum radius as above. We have compensated for that in at least three ways:

1. We have undertaken two processes of track extension which have almost doubled our original track length, a process achieved by several "flyover crossovers" in quasi-figure-8 configurations.
2. Only short trains of short rolling stock and locomotives are used
3. Scale speeds of around 40kph (25mph) are used.

What will a small scale live steam locomotive be like?

This one is a bit like "How long is a piece of string?" but is possibly answered by stating the obvious — it depends on whether you build your own, modify a second hand item, or purchase a ready-to-run locomotive. The same may be said for rolling stock, of course. MAMOD Limited from the UK have produced a new 0-4-0 Welsh side tank loco in Gauge 0, available in green, maroon or black liveries for A$441.75 at the time of writing. We have not had the pleasure of a "test drive", but perhaps someone out there has one and might feel inclined to send *AME* a photo, details of specifications and an operator's perspective as to its performance. MAMOD state that it measures 218 by 130 by 90mm, weighs 1.1 kilograms, has a twin double acting arrangement, and features a whistle together with forward and reverse functions. For entry level steam operation in Gauge 0, that is probably a good way to get going. Perhaps you may source an elderly (1923-WW2) Bowman or Bassett-Lowke locomotive from *AME* advertisements, your local club network or one of the Hornby Collectors' auctions (you need to be a member to bid) which are held in some of the capital cities annually. We purchased our B/L *Enterprise* 4-4-0 spirit-fired steamer by just this process.

In this and future editions of *Tracks 'n' Trees* we will present a listing of various sources from which you may obtain appropriate kits, secondhand or ready-to-run live steam locomotives in both the gauges we are currently considering.

Suffice to say that all live steam locomotives share some basics: they all burn some type of fuel (methylated spirits/pellets/coal/butane gas) to convert water into steam and move cylinders. They have actual working parts such as pushrods, valve gear, whistles, pressure gauges, relief valves, feedwater pumps and so on, with some models being as basic as a potboiler (vertical boiler) containing boiler, cylinders, valves and pushrods, while others, such as Gauge One Aster models, have lots of fine scale detailing. You can build whatever you want, however you want, depending upon your interest, skills, workshop facilities, time and, yes, money available!

What will a small scale live steam locomotive cost?

Another question which triggers a myriad of answer responses, but it depends on which of the above methods you use to enter the hobby. We know of model engineers who have used little money but lots of their time and skills to produce such models which range from the basic to the 'rivet counted' engineering marvel. Since they are all made of metal, you can choose from working with cast metals, copper, brass, steel and stainless steel, and different designs come with trade-offs in the degree of construction complexity, cost and efficiency. Some designs have two cylinders and others only one. Cylinders may be oscillating (single-piece driving rod and moving cylinder to accommodate the driving wheel action) or fixed (with a wristpin on the driving rod).

You can buy a ready-to-go live steam locomotive for under A$500 or you can spend thousands — how short are your arms and how deep are your pockets?

How will a live steam locomotive perform?

As a general guide, small scale live steamers will pull about the same load at about the same speed as your electric equivalent. It's how they do it which differentiates them.

The actual driving techniques become much more like the real thing, because live steam models seem to feel changes in gradient and/or load, thus requiring an actual increase in throttle to accommodate these. They start and stop with much more realism than an electric loco and they need you to drive them down grades because they are not subject to resistive braking. Put simply, if you want to drive a scale model, go live steam; if you want to look at a scale model, go electric.

Your small scale live steam locomotive may have a gas-fired ceramic burner, a large metho tank and wicks, small/large firebox and coal bunker or a small/large pellet burner tray, but in any event, a minimum running time of about 15 to 20 minutes seems to be typical.

On our 40 metre track, with a typical lap time of around 3 minutes, that's a reasonable amount of driving — we have a number of gradient changes, a couple of narrow portals to negotiate, three reasonably tight loops to navigate and several stops to make each lap (for the various industries, etc. and to add to the illusion of track length). It may be necessary for you to stop your locomotive and service it after each run (and before the initial run!) just like the real thing. Gas and metho tanks are designed to run out of fuel before the boiler runs out of water, as a safety measure, so topping up boilers and tenders, fuel tanks, steam lubricators, etc. will vary with each locomotive and your steaming bay facilities. Typical service stops are two to three minutes, so you could spend all day in your garden, running your steam driven model loco, if you so desired.

What about building a small scale live steam locomotive?

There are arguments for and against building one of the smaller models, particularly if you are not experienced at model engineering. Notwithstanding that statement, there are many newcomer and experienced model engineers who have built, and successfully run, Gauge 1 and Gauge 0 live steam locos — some, like yours truly, are going about it through having purchased one of the older models and "cutting teeth" on it to gain a better understanding of the theory of live steam operation. We have the workshop facilities, and have embarked upon constructing our own locomotive, but at the same time, can run any one of our eight other locomotives in the garden setting. (Perhaps I should be building instead of writing this ...?)

We purchased Martin Evans' book, *The Model Steam Locomotive* to assist us, and would recommend others who need to, do the same. It is available through *AME* advertisers.

Which type of fuel should we use?

Small scale, coal-fired locomotives are rare, and there are tricky things like reducing the coal to appropriate sized pieces and successfully getting it into the firebox, to be considered, but, that aside, there is probably no nicer purveying smell than the combination of steam, steam oil and burning coal! Methylated spirit burners are quite satisfactory to use — beware the spilling of spirit in the steaming bay when the wicks are alight, however! - and we would recommend the common-ordinary-garden variety methylated spirits (ethyl alcohol) as opposed to the poisonous-to-handle methanol, or the glycerine-containing propanol, which will adversely coat your boiler and lower its efficiency.

If you doubt our comments regarding the use of methanol, please carefully read the POISON, DANGER, FLAMMABLE, HARMFUL IF INHALED, CANNOT BE MADE NON-POISONOUS, etc. label on a methanol container.

Pellets are readily available, as is gas, and it really boils (pun intended) down to personal preference, availability considering your geographical location, and the design characteristics of your chosen locomotive.

Whatever the fuel, try to keep your steaming bay meticulously safe, and take all necessary precautions to prevent burning fuel from burning YOU, couplers, rolling stock, etc. The flames from burning methylated spirits are almost invisible in daylight, and bubbling paint or plastic from a favourite piece of rolling stock might not be the preferred safety indicator to use. We use a pinch of baking soda to a 500ml spirit bottle, and this does not affect the burning operation, but does colour the flame yellow to make it more visible. If you have a wick burner, remember that blue indicates a hot flame.

What kind of water should be used in a small scale model boiler?

Distilled water. De-mineralised water simply re-ionises on contact with your metal boiler, and increases the production of boiler scale with time. Distilled water leaves no boiler scale.

In summary, and acknowledging there is much more to it, we have attempted to provide an introduction to small scale live steam locomotive model engineering and operation. There will be more such material in forthcoming articles and we hope you are enjoying whatever it is you are doing in this wonderful hobby!

Do you have a garden railway or building one? Tell us at *AME*

Help wanted? Apply within: a resource guide to small scale live steam

The following information contains postal addresses, website details and E-mail addresses of quite a number of foreign manufacturers, agents and distributors of small scale (Gauge 1, Gauge 0 and HO) live steam products. This information is passed on to the reader in good faith, given the information available at the time, but is not an exhaustive list, and nor has it been assembled for any pecuniary gain or favour. Please contact *AME* with any feedback resulting from subsequent enquiries you may make to these, or other, sources of products. We can all benefit from information shared.

Gauge 1

Gauge One Model Railway Association (G1MRA)

The UK-based association. Membership secretary: Mrs L F Foster, 32 Roberts Road, Poole, Dorset BH17 7HF, UK. New members will receive with their introductory pack, the project book — a step by step guide to building a single cylinder 0-6-0 Fowler 4F. Website www.gaugeone.org A printable application form can be obtained from the website.

Locomotives and spares

Aster Hobbies Ltd (GR)
PO Box 61
Abbots Langley
Hertfordshire WD5 0ZJ
UK
Website: www.asterhobbies.co.uk

Aster Hobby Co Inc
1-13-34 Hakusan
Midori-ku
Yokohama
JAPAN 226-0006
E-mail (in English) sales@asterhobby.co.jp
Website: www.asterhobby.com

Drawing plans, try

Paul Forsyth Models
78 Laburnum Crescent
Northampton NN3 2LF UK
(4-6-0 918 class 4-4-2 Atlantic,
2-6-4T coal tank, 4-6-2T "Empire Maid",
4-4-0 Director and Belpaire classes,
4-4-2T Tilbury Tank,
4-6-0 Castle class)

Nexus Special Interests
Nexus House
Boundary Way
Hemel Hemstead
Hertfordshire HP2 7ST UK
(2-6-2 Green Arrow, 4-4-2, LBSC Southern Belle, 0-4-0T LBSC Juliet, 4-6-0 LBSC Class 5 Dot, 4-6-2 LBSC coal-fired Diana, 0-8-0 LBSC T-class Netta, 2-4-0 LBSC LNWR Mabel)

Meg Steam
161 Lohr Road
Victoria BC V8X 3X3
CANADA
For "Gammy" a UK-style outside framed 0-4-0 side tank. Its fixed cylinders have Hackworth valve gear and the loco is meths fired. Wheels can be Gauge 1 OR Gauge 0.
Plans price $US35 plus $10 shipping

Finescale Locomotive Co
PO Box 1534
Marlborough Wiltshire SN8 1ZY UK

More next time ...

Club Roundup

compiled by David Proctor

Auckland, NZ

The August Bits and Pieces night saw some interesting items on the table. First up was Murray Lane's example of a drill grinding machine. He deviated from the design by using a flat belt rather than a round or vee belt; to eliminate the vibration that these belts produce when running at high speed. Hugh Martin brought along his completed Allchin traction engine.

Machining holes on the end of round shafts is simplicity itself when using Derek Simond's fixture. This is simply a section of square stock with a hole bored down the centre the same size as the shaft, a grub screw secures the shaft to the fixture which set in the vice enables the square to be milled and indexed with east. Derek has made what could best be described as adjustable parallels. Imagine two triangles set hypotenuse to hypotenuse to form a rectangle, suitable tongue and grooved together with brass friction blocks. These can be slid in either direction to provide a degree of height adjustment. Derek finds them invaluable for supporting long work on the mill, and because the angle is less than 7° friction keeps them in place.

Auckland Society of Model Engineers
Location: *Petersen Road Reserve, Waipuna Road, Panmure*
Public Running: *Every Sunday*
www.asme.org.nz

Balcatta, WA

In early July, the first piece of machinery to be delivered to the Society's new club house, a shaper donated some time ago by Ernie Redford, was off-loaded and manoeuvred through the doors and into the ground floor workshop area. This is one of a number of machines and other tools that will be available for members' use once the club house and workshop facilities are completed. A real beaut lathe of considerable size and in A1 condition, plus a small surface grinder have appeared in the workshop. Thanks to the superhuman efforts of a small but determined band of members, the club house will be ready in time for the AGM in October.

In answer to an overwhelming clamour for a public-free run day, for just driving trains, for driver training. loco testing or even just socialising — as from September, a members only monthly fun-run day will be held on the Saturday following the 2nd Friday of the month from 12.00 to 4.00 pm.

Northern Districts Model Engineering Society
Location: *Vasto Place, Balcatta*
Public Running: *Last Sunday*
http://www4.tpg.com.au/users/jimclark

Blenheim, NZ

Work continues on the new trolley shed with the railing almost finished and access steps to be fitted. The approach rails from the traverser to shed are also being laid. The boat shed has reclad in colour steel and we hope this will discourage further vandalism. A decision still has to be made concerning repairs to the door.

In the aero section it has been a fairly typical winter season with the odd flying days missed due to rain, wind or both. There is more water in the area than for some years, but the strip, pit area and taxi ways have remained usable. We missed out on the Motueka Fly-in due to boggy conditions at their strip. But look forward to the Woodbourne fly-in late July. Aero membership has now reached 19, most gratifying, as 18 months ago we were a bit worried about numbers.

Marlborough Associated Modellers Society Inc
Location: *Brayshaw Park, Blenheim*
Public Running: *1st Sunday*

The new trolley shed for the ground level track at Blenheim Photo: Peter Holdaway

Box Hill, Vic

The number who took part in our driver training day. There were four learning the G class in the morning and a similar number on *Casey* in the afternoon, not the same ones though.

A bobcat has begun work on a path to the containers, although it will be necessary to get it back again as more earth needs to be removed. It has been decided to purchase Westinghouse air receivers for the braking system on carriages as these have proved to be more satisfactory than the original 3" water pipe that was proposed.

Box Hill Miniature Steam Railway Society
Location: *Elgar & Belmore Sts, Box Hill*
Public Running: *2nd and 4th Sundays*

Burnaby, BC Canada

The Raised Track Committee has finally completed the survey and planning for the raised track When John Haslam passed away about 15 years ago he was working on a $3^1/_2$" gauge Atlantic *Maisie*. His widow, Verna, didn't want to see it thrown out, so she has donated the locomotive and plans to the club to be finished in memory of John. The Raised Track Committee is very interested in finishing this locomotive. The newest club loco being built, the F7A, CNR, is progressing.

Our Trainfest in August was a roaring success. We had a large number of visiting engines up from the States, plus visitors from as far away as New Zealand and the UK. Friday the 11th was basically a hobby day and in the evening the running blended with social activities at the station. Saturday morning started with a breakfast, followed by a steam-up in anticipation of opening the gates to passengers at 11 am. Passenger traffic was fairly heavy all day, but the large number of engines meant that the biggest problem was keeping trains from backing up at the station. On Sunday many of our visitors had to leave in the early afternoon, so those who stayed got a real workout as the passenger count was considerably up over the Saturday. Over 2200 passengers carried, representing over 2600 person-km, and a gross revenue of over $5500.

British Columbia Soc. of Model Engineers
Location: *Rainbow Creek Station, 120 Nth Willingdon Ave, Burnaby, BC.*
Public Running: *Saturday, Sunday & public holidays, Easter to Thanksgiving*

Christchurch NZ

While we all take a rest from Sunday parties and continue to wait for the council to grind its way through our relocation application, work continues on acquiring grants for materials for the redevelopment project. Recently another two tons of track steel, one ton of RHS and the entire plywood for the trolleys have been obtained through grants and donations. All the trolley bogies and draw bars are complete and ready for the bodies to be constructed. Items for the new site such as turntable, loco hoist and steaming bay stands are all taking shape in workshops around town.

Two new boats have been launched. The M.V. *Oshibee* — scratchbuilt by Dereck Gillie is approx. 1300mm long, using an Electronize speed controller and a diesel sound generator. The *Lady Carol*, scratchbuilt by Ewan Alison, is a scratchbuilt twin screw launch approx. 1500mm long, and carries an all-female crew.

Canterbury Soc of Model & Experimental Engineers
Location: *26 Andrews Cres, Christchurch*
Public Running: *1st & 3rd Sundays*
www.csmee.org.nz

Evandale Tas

Having been on a high following the successful AALS convention held at our site last Easter our members were suddenly brought down to earth on July 9 by the sudden and untimely passing of our esteemed president, Geoff Baumgartner. Geoff was a hard working president over the last three years, a man whose love of trains and modelling of such (especially Victorian locos) was unsurpassed. For those who knew Geoff, he was a tall, quiet, unassuming man who went about his every day life in a manner befitting the true gentleman that he was. To his widow Carmel and family our society extends its full sympathy. As we now endeavour to replace him as president we know that his shoes are going to be extremely hard to fill.

We have had a number of working bees since the convention and have since removed the "swivel point" leading to the carriage shed and replaced it with 3 new sets of points making movement in this area a lot easier. The infamous "Blundstone Incline" (from the bottom shed to the 5" track) is to be removed and replaced by an alternative route that will hopefully remove the need to carry heart attack tablets. Our AGM was held on September and our new president is Peter Lawson, the drive behind the convention, the secretary is Sue Bye and the treasurer is Dianne Lawson (the drive behind the drive!). Railex 2002 will be held on November 9 and 10 (see Coming Events). Further information may be found at our web site

Evandale Light Railway & Steam Society Inc
Location: *Rear of Falls Park, Evandale*
Public Running: *Every Sunday*
www.evandale-light-rail.org.au

Gosford NSW

The purchase of our new 41 class petrol-hydraulic club loco should prove a boon to Duty-Officers trying to provide rides for our ever growing queues of customers.

The Inter-Club Invitation Run was held on the weekend of 29 - 30 June. The weekend was very successful and a tribute to those members who worked so hard to make it a success. Visitors from several other clubs attended and were complimentary about the organization of the day and the general appearance of the grounds and the facilities.

Central Coast Steam Model Co-op Ltd
Location: *Lot 10 Showground Rd, Narara*
Public Running: *1st Saturday*

Hamilton, NZ

At the AGM approval was given by all the members attending to go ahead with relocating the traction engines down to the track.

It has been agreed by the members of HME that we organise a challenge for the convention. After some discussion and demonstration, we have decided on a steam winch or steam hauler. The club will be supplying the gears and plans for the winch. It will be up to each individual club to decide what they will build but all we request is that the gears are used and the boiler and burner be constructed as to the plan. The challenge will be called *The Les Moore Memorial Challenge* and we hope that future Conventions will carry on the challenges.

So far the $3^{1}/_{2}$"/5" track had had five new points added and the $7^{1}/_{4}$" rail is now added to more than half the line. At the same time the track is being lifted, reballasted and re-laid.

Hamilton Model Engineers Inc
Location: *Minogue Park, Tui Avenue*
Public Running: *Every Sunday*
http://communities.msn.com/HamiltonModelEngineers&naventryid=106

Knysna, South Africa

Workdays, every Wednesday afternoon, have been well attended and much has been done — repairs and replacements to the inner track and retaining walls, painting of the station area, new storage area and points, new steaming bay, to name a few. With a membership of 20, there are 7 locos under construction, which is a pretty good effort.

Club evenings are held each month on the 3rd Wednesday, on a rotation basis at a member's home, concluding with a workshop session. The KSME newsletter reports the inaugural meeting of the Plettenberg Bay Miniature Railway Society.

Another item reported in the KSME newsletter reads:

"JLS beats Aussie record

Congratulations to the Johannesburg Live Steamers who have beaten the Aussie record for continuous running of miniature steam locomotives. On Sunday 9th June 2002, the members of JLS shattered the 93 miles travelled in 24 hours by live steam locomotives record, by travelling 118.4 miles in 24 hours. We don' seem to be able to beat the Aussies at rugby and cricket, but we can show them a thing o two on the track."

(Now, that has to be a challenge! ... Ed.)

Knysna Society of Model Engineers
Location: *42 Ridge Road, Paradise, Knysna*
Public Running: *1st and 3rd Sunday (am)*

Maidstone, NZ

The Committee has arranged for the end of the station to be altered and it will be done by a builder along with repair work on the footbridge and the preparation for a roller door on the storage end of the clubhouse. Gavin McCabe has been planning for the track work at the south of the clubhouse. There will be a 'single slip' set of points put in so the tunnel road crosses over the mainline to the back shunt, eventually giving access to the end of the building and there is a slip route back onto the mainline.

We have had our ticket selling window moved to the northern end of the station building to suit the improved passenger traffic flows that have been made possible by the additional concrete surfacing just completed. We have had a new door installed between the station building and the boxed in area between the station canopy. We took advantage of a window of opportunity, of a few patches of blue in the sky on 6th July and put down the concrete apron around our station and new BBQ pad.

Maidstone Model Engineering Soc. Inc
Location: *Maidstone Park, Upper Hutt*
Public Running: *Every Sun. pm Oct-April*

Mangere, NZ

The traditional Queens Birthday Invitation Weekend was given special treatment this year as 21 years has passed since the club was formed. On the Saturday the weather was not very kind but we still had a great time catching up with friends around the pot belly stove. The hardy souls drove despite the rain. On Sunday the weather was fabulous and the public turned up in droves. All trains were running at full capacity keeping drivers and helpers very buy. The Sunday evening function started with a fabulous meal and entertainment for the evening was provided by Joe Fingers Webster and his three piece Jazz Band. This group kept all the feet tapping during the evening with songs from yesteryear and any other requests from the floor. Life Membership Certificates were awarded to Peter Hudson and Harold Wilkes for their outstanding service to the club.

The weather was back to wind and rain on Monday, and most of the visitors packed up and headed for home around lunchtime. 3100 rides were given over the three days.

Manukau Live Steamers Inc
Location: *Mangere Centre Park, Robertson Road, Mangere*
Public Running: *Every Sunday*
http://sites.netscape.net/manukaulivesteam

Melbourne, Vic

Since the last time I reported in this column at least two club meetings have passed and a number of speakers have spoken on a variety of subjects. Guest speakers Ian, ames and Bob did a brilliant job of displaying their wonderful collection of glass slides with the aid of a much loved antique projector. It was like going back in time and everyone enjoyed the experience.

At the next meeting, club member and club librarian Don presented a history of model aircraft remote controls dating back to the 60's with lots of hands on examples to see as the picture included shows. Of course there's always a good display of models on the table for everyone to enjoy and talk about at each meeting. Note: Visitors are always welcome to attend.

Melbourne Society of Model & Experimental Engineers.
Location: *Meetings are held 2nd Friday of Month at 92 Wills St, Glen Iris 8.00pm start.*
Public Running: *None*

Moorabbin, Vic

The second outside track is up and running. It is Gauge 1, about 50 metres in length with a large siding for steaming up and storing stock. The crossover stairs have been bolted into place but the central tunnel is yet to be done and the storage shelf under the track is still to be finished. Boilers for steam locos on Gauges 1 and 0 will be subject to registration and check with regard to the limits inherent in the AMBSC Codes and their safe operation. Boilers with properties less than the Code lower limits will be subject to a periodic operational check, particularly with regard to the safety valve setting and operation.

The concrete slabs at the rear door of the clubhouse and nearby steaming bay areas that were lifting, causing a tripping hazard, have been broken out and the first section recast, this time with steel mesh reinforcement. The fountain has had its water lines reamed out and a lot of the crud removed, decreasing the line resistance and permitting the poor old pump to put out a greater volume.

Steam Locomotive Society of Victoria
Location: *128 Rowans Road, Moorabbin*
Public Running: *1st Sunday*

Mudgee, NSW

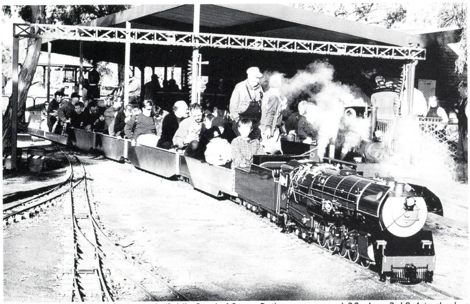
The new $5 per person unlimited ride ticket has proved popular and has seen people buying these unlimited ride tickets where they might only buy two or three single ride tickets otherwise.

At the AGM the election of officers resulted in:- P Mattick, President; C Limb, Vice President; P King, Secretary and L King, Treasurer.

A new poly tank has been fitted on the tank stand behind the toilet block replacing the old corrugated tank that had more holes in it than a tea strainer.

Following our advertising on the local radio stations during the week leading up to the July running day, for the first time, no one turned up without the correct shoes. A total of 190 single ride tickets and 17 unlimited ride tickets were sold. Not bad for a cold, overcast day. One thing we noticed was that there were a lot more locals there than in past running days.

Mudgee Miniature Railway
Location: *Cassilis Road, Mudgee*
Public Running: *2nd Sunday, Easter and Wine Festival*



Remember the photo of John wakefield's South African Railways proposed 22 class 2-10-4 in the last issue of Club Roundup? As you can see, it is now in service at the Morphett Vale track.

Some of the specifications are:

Length: 15'6"
Width: 22"
Height: 26"
Weight: 1 tonne
Grate area: 210 sq. ins
Cylinders: $3^3/_4$" x $5^1/_2$"
Driving wheel dia. :$9^3/_4$"
Boiler (steel Briggs): 10" dia.
Piston valves
Tender water capacity: 36 gallons
Construction time: $4^1/_2$ years

Nelson, NZ

We are slowly getting through the list of jobs around the Club. Painting of the workshop and station has been completed, and the flagpole has been re-stepped. Tiles along the station fence have been laid and the concrete ramp at the north end of the station is finished.

The saga of the sewerage from Natureland into the pond has been finalised. A meeting with Council members convinced them that Natureland should divert their drain waste into the sewer direct. With this problem solved, we felt we could treat the pond with copper sulphate to kill the weed and algae. We can now work towards a clean pond for the *Navy Lark* and model boats.

The Model Boating Club have started to concrete their stand area where they will set up and operate their models. With the fence it will allow them to display models without members of the public walking among them.

Nelson Society of Modellers Inc
Location: *adjacent to Tahunanui Beach, Walkare St, Tahunanui*
Public Running: *Every Sunday (pm)*

Newcastle, NSW

The drainage planned after the 1999 AALS Convention has been completed. All the worst affected areas are now drained and around 80% of the area used by the members and the public have been covered. During construction, club operations were unaffected and no services were cut or broken. Overall club drainage is 650 metres of pipe, 37 pits with grates and six surface grates installed. As a postscript to an earlier progress report and comments by Joe Huntley as how dry the park is, it must be noted that Joe now carries the water bottle, presented to him by Bob Rottenbury at our last Birthday Run, for him to cope with such dry conditions.

A project was started on a tunnel for the $7^1/_4$" track in 1997. We acquired suitable pipes for the tunnel, dug a hole at the selected location. Foundations were constructed so the pipes would be held true and straight. A crane lifted the pipes into place and the hole was backfilled and rubble pushed along the sides. The pipes had a suitable road base laid inside and track soon followed. This tunnel remained like a pipe through a heap of rubble for some time. It was decided that crib walls at each end would make the pipes look more like a tunnel. A design was decided upon and a quantity of suitable concrete locking blocks was purchased. This is how the tunnel stayed for a couple of years. The Directors decided it would be a suitable project for "Work for the Dole" group that was about to start work in the park on other projects. A new plan was formulated to make the crib ends from rock using the same construction techniques as other retaining walls around the park. The original block walls were removed and construction started in

April 2001. Once the end crib walls were complete a local earth moving contractor was hired to cover the tunnel using a front-end loader and to supply 80 tons of suitable soil. Our Landcare group organised delivery of 30 cubic metres of mulch, which was shifted over the tunnel manually. Bob Leonard and Andrew O'Donnell then planted about 300 native plants of various types including grasses, shrubs and trees around and over the tunnel. The total was 500 in the end because, after a spate of vandalism, a further 250 were planted. The first official train through the completed tunnel was Les Banhidi who had the newest $7^{1}/_{4}$ " loco. The project was completed in February 2002.

Lake Macquarie Live Steam Locomotive Soc. Ltd
Location: *off Velinda Street, Edgeworth*
Public Running: *Last Sunday (ex. Dec)*

Perth WA

Castledare celebrated a milestone in August, with the carrying of a million passengers over thirty nine years of operation. The Mayor of the City of Canning and Patron of the club, Dr Michael Lekias, very kindly agreed to officiate at the occasion. The station was decorated for the event, and a fanfare of train whistles sounded as the millionth passenger was counted onto the platform. The Mayor then rode on the ceremonial train, and returned to the station for the cutting and distribution of a celebratory cake. Despite indifferent weather, the occasion was judged a success. It also gave the Mayor an opportunity to inspect recent progress made by the club, and to appreciate the challenges faced in the upkeep of our extensive facilities.

The September run day coincided with Father's Day, which is usually our busiest day of the year. Unfortunately, the day dawned with heavy rain and forecasts of gales and hailstorms to come. This served to deter all but the hardiest visitors. Instead of the usual queues of people waiting for trains, the trains were waiting for passengers. Hopefully next month will see a return of the crowds.

The maintenance effort is continuing. One of the more conspicuous results is a superb piece of stone retaining wall construction which has transformed the approach to Niana Station along "Charlie's Bank". Further out, work has started on a major track re-alignment at the junction with the Fern Road loop. This will ease train operations up the 1 in 28 Fern Road Bank, by reducing the initial gradient and removing a set of double slips which currently enforce a speed restriction at the foot of the ascent. Approvals have also been received to commence the extension and enclosure of the existing 5-inch gauge shed. This will provide new workshop space for the club. An extension of the visitors' picnic area is also in progress.

Planning continues for the club's 40th anniversary next year. The plan is to invite other AALS clubs to a celebration run on the 4th and 5th of October 2003.

Our club can be contacted via the secretary, Ken Belcher, on (08) 9375 1223, email: skbelcher@wiredcity.com.au

Castledare Miniature Railways of WA (inc).
Location: *Castledare Place, Wilson*
Public Running: *First Sunday*
http://d1565.tripod.com/cmr/

Warner QLD

70th Anniversary

I mentioned last issue that I would give a brief run down of the QSMEE. Below is an extract from the history of the Society.

Norm Shannon founded the Queensland Society of Model and Experimental Engineers on 17 February 1932. The first meeting took place in Room 413, 4th Floor, Colonial Mutual Building, Queen Street ,Brisbane, next door to the GPO There were 10 persons in attendance, namely N Shannon, H Eustace, W Kenyon, D Vincent, H Smith, V Darra, H Tate, Mr Hunt, P Benson and C Guymer. Norm Shannon was the societies first President and Vic Darra the first Secretary/Treasurer. (These two positions were combined until 1966.)

The QSMEE was the first model club in Queensland and for many years catered for those persons who's interests lay in model cars, airplanes, boats and electric/clockwork trains. Other societies were formed after 1948 to cater specifically for the needs of these sections of the hobby. The first exhibition of models of member's work was held at the home of Hardy Eustace in Teneriffe on July 16, 1932, just over 70 years ago.

During the first 70 years of the society, 15 people have held the position of President, the longest serving being Len Thompson with 14 continuous years. Charlie Garner, an early identity of the society, held the position of Secretary/Treasures for 18 years, a position he never nominated for, but accepted 18 times. He was later elected the first life member of the society.

The society's first patron, Cliff Isles, from Isles Love & Co Pty. Ltd., held the position until 1965. He donated a cup to be awarded annually for a model constructed by a member of the society. He retired from the position of Patron in 1965 due to ill health. The Commissioner for Railways at that time, Alva Lee, then accepted the position of patron for 3 years, after which the position remained unfilled until 1983 when Barrie Hardie accepted it. When the Society became Incorporated the new rules did not have a provision for a Patron.

The aforementioned cup, although inscribed as the 'Championship Cup', was for many years known as the Isles Trophy, then the Patrons Trophy and then the Presidents Cup. After the society's Incorporation the cup was renamed as the Championship Cup.

An ambition of the society for many years was to have its own live steam railway on its own property. Long before this became a reality, the society's first railway was erected at the Yeronga home of George Chalmers. This was a simple up and down line with $2^{1}/_{2}$" inch gauge being the larges gauge accommodated. The track was owned by the Society, and was in operation from 1939 to 1948. It was later sold to membe Ron Clarkson, who built his own ground level railway around his Annerley home in 1951.

In 1947, the Society leased land from the Brisbane City Council in Yeronga Park with the intention of constructing a live steam railway, a boat pond and a club house. Although earthworks were organised, no construction is recorded as having commenced and the lease was terminated in 1949.

Members had constructed tracks in their own properties and these were used by the Society for regular track days. The tracks in use were at Annerley (Clarkson's, in operation 1951 - 1969), Mitchelton (Jim Jackson, 1961 - 1967), Kuraby (Eric Evans, 1964 - 1969, the first with 5" gauge) and The Grange (Merv Olssons, 1968 - 1973). Merv's track had $7^{1}/_{4}$"" gauge added during its use by the Society. All these were ground level tracks.

The Society commenced leasing part of the current Strathpine property belonging to Jim Jackson in 1967 and commenced construction of a permanent club miniature railway. The official opening was held in 1973, with Chris George driving the first train to complete a circuit. Since then the track has been added to considerably.

Some early track on the property, donated by Eric Evans had been reclaimed from his Kuraby & Central Line, and was laid on the ground around a dam (long gone) under the power lines at the back of the property. In 1976, this track was relocated to an elevated position nearer to the canteen area where it remains to this day, although a substantial extension was completed in 1994. Part of Eric's original Kuraby track is still in operation on the steel post section, the foundations of which are currently being upgraded.

In 1986, the society purchased an interest in the property from Jim Jackson, which was later converted to a subdivision, the society owning the back half. The purchase price was raised by member's interest free loans, debentures and donations. All moneys loaned were paid back by 1993.

For many years, there was no mains power connected to the site and no water other than tank water. Power was finally connected in the early 1990's and the bore for water (other than human and locomotive consumption) was sunk in 1990. The toilet block was partly financed by a grant, but was constructed by members of the Society. It was completed in 1997. In the 30 years leading up to this time, various other toilet facilities were in use on the site.

There have been four Australian Live Steam Conventions held at Warner, in 1978, 1982, 1990 and 2000. The Convention in 1982 helped celebrate the Society's 50th anniversary. For the Society's 60th anniversary, the railway-like signal box, which helps

Driving the commemorative spike

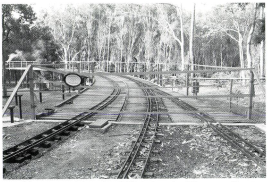
control the movement of trains around the complex, was opened.

One of the most important aspects of the society throughout its 70 years, has been the help the members receive from their families and in particular the ladies.

The Society was Incorporated July 1992.

The following memorabilia was on display at the 70th Birthday celebrations.

- Denis Martin's $3^1/_2$" gauge QR AC16 2-8-2 built by Jim Jackson in the 1950's, a regular performer at the Annerley, Mitchelton and Kuraby tracks in the 1950's and 60's. Isles Trophy winner for 1958.
- Harry Buggs' $3^1/_2$" gauge *Britannia* built in the 1950's, now owned by the QSMEE. Harry Piggott restored this engine to service in the 1990's. The Isles Trophy winner for 1959.
- $2^1/_2$" gauge, 3 cyl. *Uranus* built by Alan Quaff to the design by LBSC in 1932. Alan was the 2nd President of the Society in 1934 & 1935. This engine, completed in 1940, ran at the Yeronga track in the 1940's and was a regular exhibit at the Queensland Industries Fair for many years.
- Chris George's Stationary Engine, which was displayed at the Society's first Model Exhibition in 1932 at the residence of Hardy Eustace.

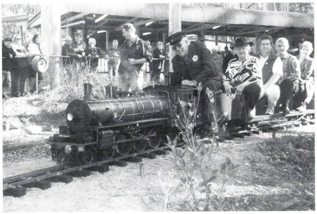


Ribbons awaiting the Official train. The new line is the one to the left.

- $1^3/_4$" gauge QR clerestory roofed carriage built by Charlie Garner, a long time Secretary/Treasurer of the Society.
- Original Club Block and receipt for it from Economy Printers, Elizabeth Street, Brisbane, 1936. The receipt is made out to Mr. Ross, the Society's Secretary/Treasurer.
- The Championship Cup. (The Isles Trophy as previously described).
- The Society's second club loco. $3^1/_2$" gauge 0-6-0 tank engine designed by Harry Harley and built by the members, named after the Society's long serving Secretary/Treasurer, Charlie Garner. Now owned by Lloyd Dannenberg, it was also used as a driver training loco on the elevated track on the present grounds.
- The Chris George memorial *Clubman of the Year* perpetual award. This is presented annually recognising members for outstanding contributions to the betterment of the Society.
- The Society's Honour Board of Life Members

The Society has had three (3) club steam locomotives.

1. $2^1/_2$" gauge *Dyak* 2-6-0 tender locomotive purchased by the society in 1937. The members constructed the tender. It was sold in 1963.
2. $3^1/_2$" gauge 0-6-0 tank locomotive designed by Harry Harley and built by the members in the middle 1950's, since sold to Lloyd Dannenberg in 1968.
3. $7^1/_4$" gauge 0-4-2 tender locomotive. The plans and castings for this engine were purchased in the 1980's and the members constructed the locomotive. This engine is still in service and has recently been reconditioned. The original valve gear was Hackworth, but this was changed to Walschaerts to better suit continuous running.



The Official Train at the opening of extensions to mark the 70th year of the QSMEE. Included on the train was the Mayor of pine Rivers Shire, Yvonne Chapman (with hat))

It was a day to remember. Seasons Greetings to you all.

To visit, Contact the Secretary, PO Box 322 Everton Park 4053. All persons wishing to run equipment at our site must have AALS Insurance.

Qld Society of Model & Experimental Engineers Inc
Location: *122 Warner Road, Strathpine*
Running Day: *2nd Sunday except December, by invitation. No public running*
http://www.steammachine.com/qsmee/

West Ryde NSW

Rides in 2001/2002 increased over 5000 rides on the previous year. The new anti-tip rail and the extensive track upgrading on the ground level is paying dividends for us. The Society was featured in the Sun Herald during Easter as a suitable destination for families wanting things to do for their kids for less than $25.00. This produced a large crowd on the April running day, many of whom were new to our operation, and certainly stressed our footwear policy! We introduced a scheme for the public to pre-purchase entry tickets for party groups, and this has had some positive responses already.

The elevated carriage shed traverser (complete for 12 months now) has now been provided with its new approach track and this has been greatly appreciated on the running days with the improved ease in stowing the elevated cars.

Painting of the elevated track ground frame and channel iron is largely complete. This looks great, especially with the recently fixed green spectacle in the signal! The additional approach road to the traverser has had the concrete poured and the uprights erected. Soon the rails will be drilled, and then when all is erected, the lot will be pulled down and sent to the galvanisers. Following a motion to restrict the public to south of the elevated track, the steel bridge over the elevated was redundant and has been removed. This removed a structure that was very useful in its time, but would not meeting today's more stringent safety responsibilities. The concrete steps to the bridge have proved to be a bit more of a problem. We build to last.

Sydney Live Steam Locomotive Society
Location: *Anthony Road, West Ryde*
Public Running: *3rd Saturday (pm)*
http://www.pnc.com.au/~wallison/slsls.htm

Farewell

We say goodbye and thankyou to these model engineers who have passed on:

Bill Britton (WDLS, Fairfield)
Don Clark (Gippsland MES)
Trevor Collet (SLSLS West Ryde)
Edward Frow (Durban SME)
Roy Hughes (SCRMS Nambour)
Albert Kidd (BCMSE, Burnaby)
Graham McCarthy (Manukau LS)
Denis Tregea (QSMEE, Warner)

and extend our condolences and best wishes to the family and friends they leave behind.

Coming Events

1 to 3 November

Invitation Days — Wagga Wagga NSW

This popular annual event is on again. 5" and $7^{1}/_{4}$" track in scenic surrounds, traction engines, stationary models, historic engines, HO scale layout. Contact David Font (02)6921 4762 or email: dfont@tpg.com.au

9 to 10 November

Railex 2002 — Evandale Tasmania

The Evandale Light Railway and Steam Society will be hosting Railex 2002on Saturday November 9th from 9am to 6pm and on Sunday November 10th from 9am to 3.30pm. Further information may be found at our web site at http://www.evandale-light-rail.org.au

16 to 17 November

Annual weekend — Canley Vale NSW

The Western District Live Steamers Co-op Ltd will once again host the annual weekend which we call the "13 Class" event at our club grounds which are situated in the grounds of the Fairfield City Council Showground, Smithfield road, Canley Vale. Both 5" and $7^{1}/_{4}$" ground level and 5" and $3^{1}/_{2}$" elevated tracks are available. Steam up services on hand are air and 12 volt. Both Gregory's and UBD directories show the exact location of our track. All locos welcome regardless whether they are 13 class or not. Contact WDLS, PO Box 403, Mt Pritchard NSW 2170

16 to 17 November

20th Anniversary Weekend — Bunbury WA

Members of the SWMEA (WA) Inc would like to invite all club members to our 20th year anniversary at Forrest Park Railway, Blair Street, Bunbury. Saturday will be train running, videos, BBQ and night running. Sunday will be club's public run day for those who wish to stay over. $2^{1}/_{2}$"/$3^{1}/_{2}$"/5" elevated track, 5"/$7^{1}/_{4}$" ground level. We will supply char, coal and oil. Contact Secretary (08)9721 2034

21 to 23 February 2003

50th Birthday Run — Edgeworth NSW

The Lake Macquarie Live Steamers invite you to celebrate this special event with them. Contact Joe Huntley on (02)4954 0358 fo more details.

17 to 21 April 2003

47th AALS Convention — Salisbury North SA

The Penfield Model Engineers Soc are hosting the next AALS Convention. Information packs and registration forms have been sent out to clubs. For full details below.

8 to 12 January 2004

Steam & Steel 2004 — Hamilton NZ

The Hamilton Model Engineers are hosting the next New Zealand Convention. Full details appeared on page 44 in the last issue. For more information about this great event contact Valerie Clarke at 51 Alderson Road, Hamilton New Zealand. Ph. 64 7 8551 927, Fax 64 7 8551 307 or email bandvclark@xtra.co.nz

47th AALS Convention — Salisbury North, 2003

The 47th Annual AALS Convention is being hosted by the Penfield Model Engineers Society at the Penfield Park Railway Grounds at Salisbury North (20k north of Adelaide CBD) in South Australia over the Easter weekend from April 17 - 21.

On behalf of the AALS, you are all invited to attend. Registration packs have been sent to all club secretaries, along with details of accommodation. If you haven't seen one yet, ask your secretary for it now. And also remember, the early bird gets the best accommodation!

Points to note

A. Evening meals to be booked and prepaid, lunch purchased as required from the canteen in the club rooms.

B. All steam locos must have a current boiler certificate which is to be shown before the loco can be steamed.

C. Track is 5" and 71/4" only and to AALS standards. Flange thickness must not exceed AALS narrow gauge standards.

D. Night running — all trains to display clearly visible white light at front and red light at rear.

E. Maximum speed is 8kph and a distance of at least 100 metres to be kept between trains at this speed.

F. Track marshals will be stationed at various locations to ensure safe and responsible driving.

Facilities

- Roped off area for traction engines
- Tea, coffee, etc. at various locations
- Char and briquettes supplied, not petrol
- Rainwater from on-site tanks
- Steam and lubrication oil available
- Compressed air and 12 volt power
- Hydraulic unloading ramp
- Storage sidings and workshop facilities

Travel

Air — Qantas and Virgin Blue operate several flights daily into Adelaide

Rail — Great Southern Railway operates the *Overland* 4 times a week from Melbourne and the *Indian Pacific* twice a week from Sydney and Perth. *The Ghan* operates via Adelaide to Alice Springs.

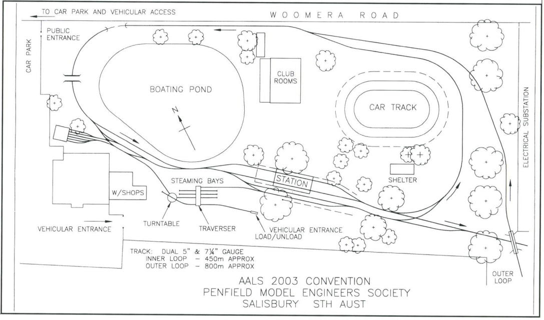
Other attractions

- **Full size live steam** — Steam ranger
  Steamtown, Peterborough
  Pichi Richi Railway, Quorn
- SA Maritime Museum, Port Adelaide
- National Railway Museum, Pt Adelaide
- Tramway Museum, St Kilda
- Barossa Wine Train (classic rail tours)

SASMEE will be hosting a post-convention run on April 22.

Registration forms and further information can be obtained from:

The Convention Secretary
Penfield Model Engineers Society
PO Box 792
Salisbury SA 5108



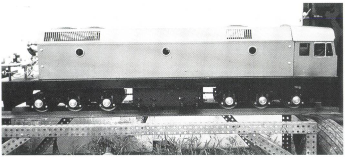
Milling Louvres

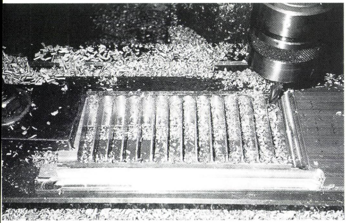
by Peter Johnson

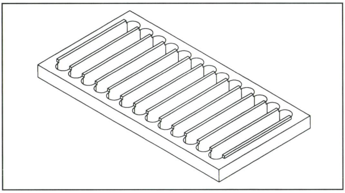
Drawings for publication from author's originals by Timothy Smith

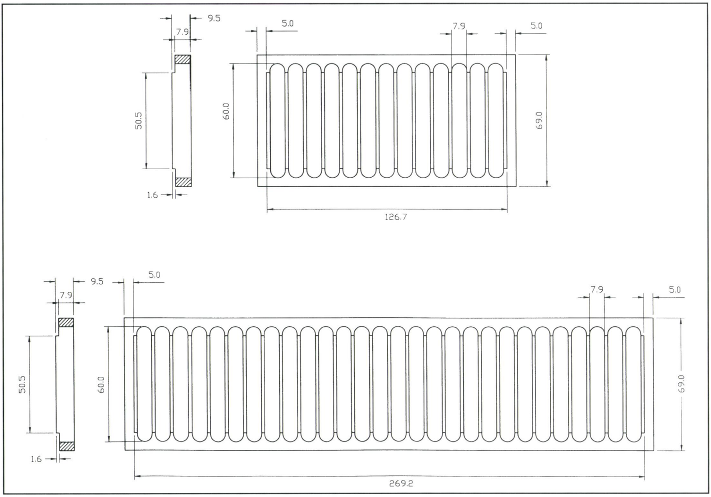
When building the AME 422 class locomotive I found milling the slots was less of a hassle than soldering all the zillions of bits together. Best to mill, say three slots in a bit of scrap metal, calculate what you can expect when all the slots are milled and get this as near as possible to Neil Graham's sizes as published in ssue 56 of AME in the 422 construction series. I used Neil's sizes from the article at the time, which from memory were 3/8" wide slots. Now you can cut the openings in the roof to suit.

Looking back, I should think a thinner piece of material would be OK.









News Desk

with David Proctor

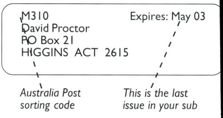
G'Day! Well, the last issue seems to have turned up its fair share of problems, some of which I plead guilty to and some which I am still talking to the printers about.

The most serious problem was that several issues came out with some of the pages blank. It appears that in some cases two sheets of paper were stuck together going through the printing presses which print both sides at the same time. If anyone who has not already contacted me has one of these copies, please let me know and I will arrange for it to be replaced with a good copy. Another problem which happened at the printers was a duplicated photo on page 25. The photo of the Mt Lyell rack loco at the foot of the page should have been a similar shot of the Bush Mill Garratt as the one on the front cover. The missing author's name under the heading on page 44 (Hot Pot Run) is mine so that is not so serious. My own errors were mainly a few missed typographical ones and some text which moved out of place on page 23. For the benefit of a couple of people who have mentioned "widows and orphans" (printing terms), these sometimes occur during the font translation from my PC formatted text to the printers' Mac formatting — they are not there when the magazine leaves here. One problem to be resolved.

When does my sub expire?

This is one of the more frequently asked questions I receive, often as a message left on the phone, which means making several long distance calls each week with the answers, running into extra expense for the magazine. In most cases this can be avoided, so for the record here are the three ways in which we let you know when your sub runs out.

1. The expiry date of your sub appears in the top right hand corner of your address label, i.e. the issue listed there is th last one you receive on your current sub Here is a sample address label:



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Next issue

The next issue will include —

- Traction Engine Rally coverage
- Melbourne Model Expo coverage
- A folding elbow gate for steaming bays and turntables
- Photos of some North American meets
- Plus the continuation of the loco test stand and regular features.

Until then, enjoy your hobby and remember, the man who cannot make a mistake cannot make any thing.

All the best for the Holiday season.

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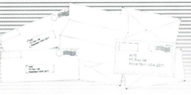
Letter Box



Wheel slippage

Sir,

Ted Crawford's cotton reel (*AME* Issue 104) is a bit different to wheels on a railway. His turntable increases speed as the diameter increases, and consequently also reduces the force, hence his results.

One point significantly different to a railway is that, unless you have a Heywood locomotive, or some other steering wheelset arrangement, our axles are only ever truly radial on tangent track! On any sort of curvature the wheel tries to run toward the outside of the rail, until the flange tries to climb, and then (hopefully) the wheel lift increases the weight on the wheel until the wheel slips back and then it starts all over again. The resulting wheel progress is a sort of zig zag on the railhead.

As the rails are fixed to gauge, and the wheels are fixed on the axle, the inner wheels must be transcribing a similar progress.

This would suggest that to some degree, our wheels are continuously slipping and sliding their way along out tracks!

As for the wheels themselves, any difference in diameter will also mean that slippage will occur. Cast iron wheels are notoriously variable in hardness, and one reason that steel tyres give such an improvement in adhesion is not just the friction related properties of the metal, but the fact they wear less and probably more consistently.

Warwick Allison
New South Wales

Sir,

The little box on page 63 of issue 103 caught my attention, because it is not hard to calculate slippage (if you enjoy recreational maths). I don't want to bore other readers with the sums, but they might be interested in some of the outcomes. It's not worth arguing when it can be settled with a little calculation!

As a wheelset with tapered treads moves off centre, the wheels change their rolling radius and the path takes up a natural curvature. Taking a 5" diameter tread with a 1.5 degree taper on a 5" gauge track, when the offset is 2mm, the radius of curvature is 101 metres. If the wheelset is forced to follow a straight line while it is offset by the 2mm, then the slippage would be 0.13% or 1.3 metres per km of travel.

Now let's place the wheelset on a curved track of 10 metres radius. If the treads are parallel, the slippage would be 1.3%. With the tapered treads, and running 2mm offset, the slippage reduces to 1.1%.

So there we have it — but we can now continue arguing over whether the effect is worth worrying about or not!

Allan Wallace
South Australia

It appears that Ted has opened up a whole new topic for discussion. It will be interesting to see how many views we receive ... Ed.

Alice

Sir,

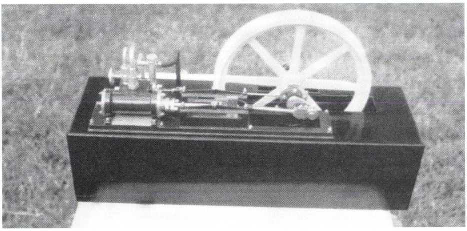
I have just been reading your magazine in the *Letter Box* section concerning an article on *Alice*, the sugar mill engine.

I have enclosed some photos (*see below*) of the one I made after the article in *AME*. It is the advanced version and is the same size as the article. I have seen the original at Cairns and this made me decide to make same. I decided to make a complete unit so I built a tube boiler, water tank and hand pump, all mounted on a base so as to put it on show, operating.

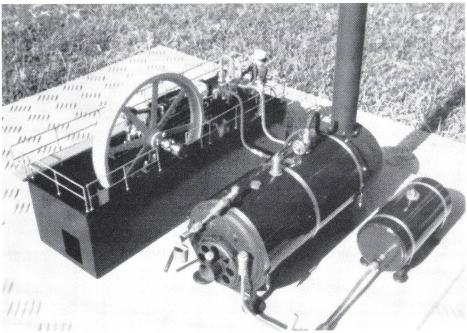
The boiler is gas fired and it works very well. It has been on display with the Melbourne Society of Model and Experimental Engineers exhibition at the Monash University, Clayton twice, running on air. The boiler is tested to 50 psi and the engine runs at 5 to 10 psi.

I can assure John Single, there is at least one model and maybe many more have been built. It is a very nice and simple engine with little effort to operate.

Alf Harder
Victoria



Above — 'Alice' under construction. Below — completed with boiler and gas tank



Boiler drawings

Sir,

In reply to "Fred" of Victoria (*AME* Sep-Oct '02) regarding drawing of boiler designs, I say it all depends on the Inspector. Provided the drawings/sketches show the general outline of sizes and gauges of materials then they can be of minimal nature.

The AMBSC Codes lay down minimum requirements such as plate thickness, flange lengths, bush dimensions, etc. Therefore all these things can be tabulated within a line drawing giving major overall dimensions and satisfy the requirements of the code.

As the builder of some 25 copper boilers from $3^1/_2$" to 8" dia. over the years, my drawings were outlines on the workshop floor in chalk. The current requirement however, has required me to change my ways which now takes more time but I suppose it covers my backside a lot more. Such is progress. The moral of the story is: before you start anything go and talk to your AMBSC boiler inspector.

'Baz'

New South Wales

Hit and Miss oil engine

Sir,

I thought your readers would be interested in my attempt at a model "Hit and Miss" oil engine. I first sighted this engine at the HME club at Galston. After some discussion with Russell Paynter, an *AME* back issue (#50) courtesy of Brian Carter and castings from Ern Winter, I decided to have a go. I have always held a fascination for old farm engines, but with limited space full size engines were out of the question. That's what I thought at that time but I have since restored three full size engines.

Anyhow, to the engine. It was certainly a learning process as some of the processes were not clear to me, and whilst destroyed castings are not uncommon in this pastime, I did not want to be one of the statistics. These anxious moments were put to rest after a call/s to Russell.

The model was originally sized for machining on the Myford ML7 or similar and with a modification to my drill stand I had the means to complete it. The crankshaft seemed a daunting task from solid bar, so I decided to fabricate it as I have done with previous steam models. That was a failure, so it was back to the solid bar. Needless to say it wasn't a problem after all.

The only change to the drawings was the gudgeon pin which called for a full floating type. I changed this to a fixed type. The glass for the oiler was taken from the barrel of a single use syringe.

The engine runs nicely at 400 rpm and whilst the full size engine was not necessarily mounted on a transporter, I thought it looked better. The box (at rear) houses the 6 volt battery and the wheels were fabricated from steam pipe and assembled with Loctite®.

For historical purposes I photographed the major stages of the process and would be willing to share this information. Many thanks to Russell Paynter and Emco Machine Tools.

John Davies

New South Wales

Parting off

Sir,

Like Peter Sheppard (*Letter Box, AME* May-June 2002) I too have for many years approached parting off in the lathe with justified anxiety and was therefore interested to read of his new found success with the Kit-Q-Cut tool.

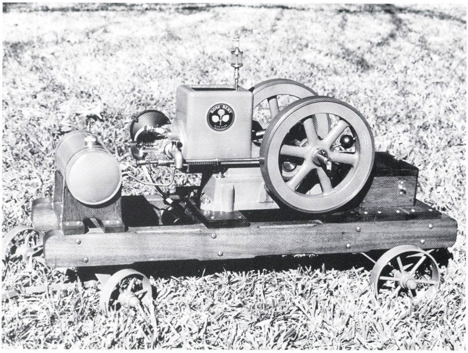
I sent for one, pleased by the though that my swarf tray would no longer be a abundant source of Eclipse parting tool fragments. Before continuing I should state tha I am not a highly skilled lathe operator, bu regard myself as careful, having set the new tool at exact centre height and at right angles to the 25mm round bar of BMS - thi latter setting achieved with a DTI held i the three jaw chuck. The other usual preparations relating to rigidity were carried ou too.

Now ready to part off some 6mm wide discs, the first cut went like a dream come true. As I was making the second cut my elation was boundless, while at the same time thinking "I must write a letter to Greenwood Tools and tell them how marvelous this tool is" when, about half way through the cut, there was a sudden and all too familiar sickening crunch. Examination showed that the carbide tip had fractured and as the fragment left the cut it damaged the spring steel holder beyond repair. So sadly it went into the bin after only one and a half cuts.

My purpose in writing is not to denigrate Greenwood Tools, as I am sure that in the hands of more experienced workers the tool would give excellent service - as claimed by Peter Sheppard - but for me it was not the solution I had hoped for. Some of your readers with similar average skill and high hope might be interested in my experience.

David Nance

Victoria



John Davies' beautifully finished Hit and Miss engine looks great on its own wagon

Letterbox Contributions

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As far as possible, *AME* is an open forum for all members of our hobby. Therefore, all expressions of fact or opinion as long as they are not libellous will be considered for publication.

Please type or clearly print your letters, as script is often difficult to interpret. Due to popularity of *Letter Box* and limited space, letters of 400 words or less will have a better chance of being published.

Handy Hint

Rolled Hollow Section (RHS) comes in a large range of sizes. Equal and unequal angles and channels can be cut, by hacksawing, cutting disc or milled to the required size. Sometimes cutting up the RHS produces banana-shaped sections which will require straightening.

— Alan Craggs

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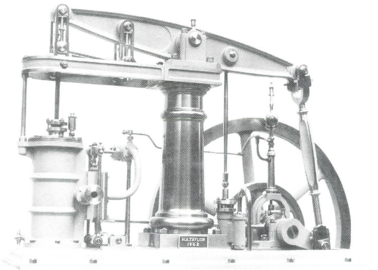

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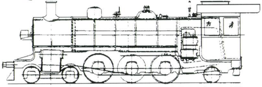

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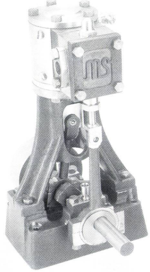

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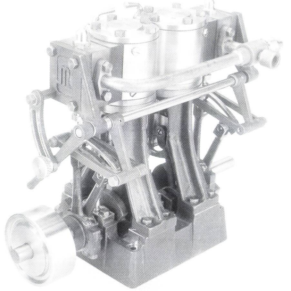

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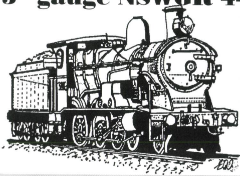

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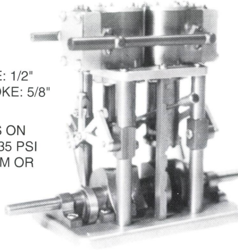

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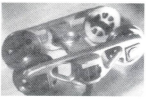

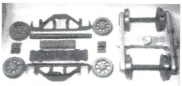

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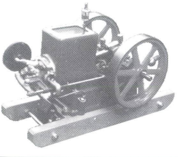

The latest addition to our IC engine range! The prototype model, designed and built by Russell Paynter, was featured in AME issue 50. For a complete change from steam construction, this little unit makes a handy sized portable engine for display or as a self contained power unit. All major parts are of aluminium with cast iron flywheels and gunmetal valve rocker bracket. Ready-cut timing gears can be supplied along with all materials necessary to build the engine.

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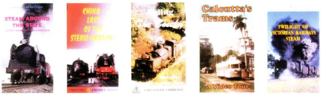
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